FOOD MANUFACTURE

Incorporating Food Industries Weekly

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP MARCH 1, 1957

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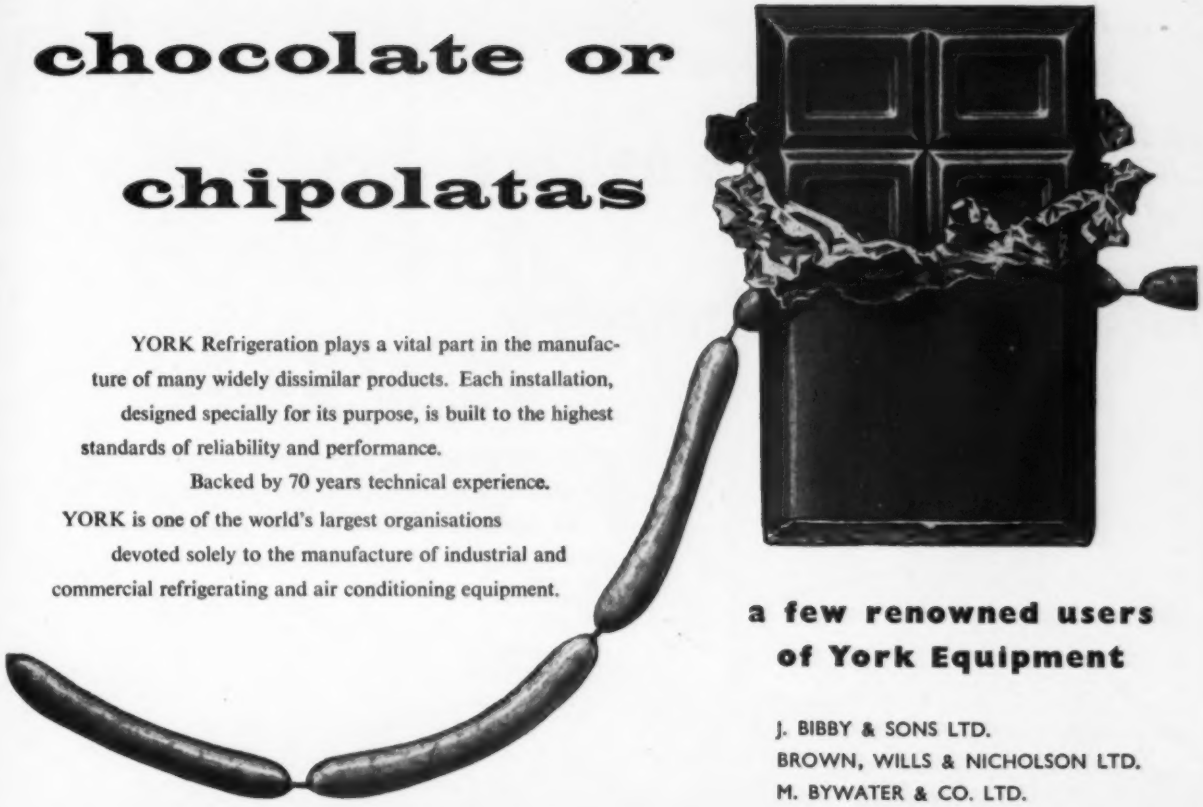

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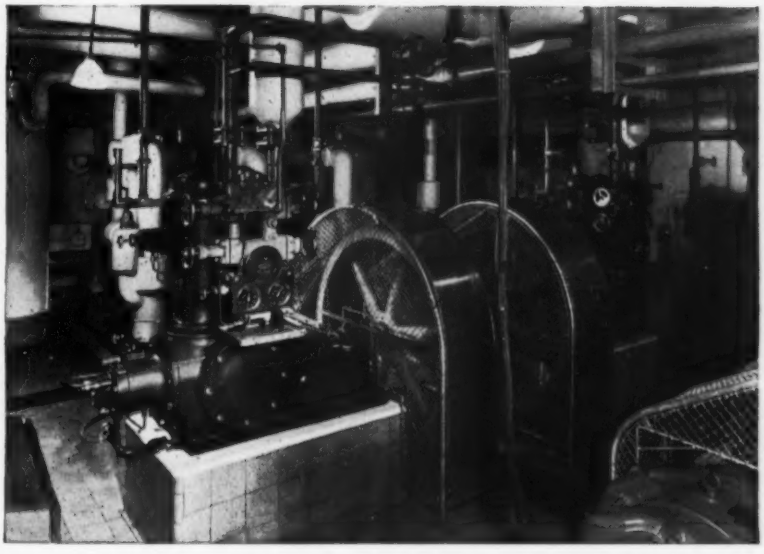

Part of the YORK refrigerating plant at the warehouse of Messrs. J. Sainsbury Ltd., Union Street, London, S.E.1. The plant includes five 6½"×6½" twin cylinder compressors, belt driven from 40 h.p. motors.

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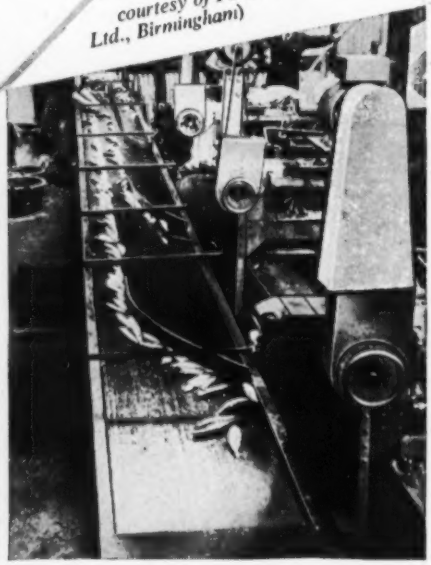

Scandura conveyor in a fish canning factory (by courtesy of Fisher & Ludlow Ltd., Birmingham)

As the pioneers of P.V.C. covered conveyor belting British Belting & Asbestos have supplied their SCANDURA belting for many varied applications. Due to its resistance to contamination and its hygienic qualities SCANDURA has become the obvious choice for food conveyor belting. Its lasting qualities had already been proved in food factories two years before its first introduction in Britain's coal mines in 1948, and its fire resistant properties have brought a hitherto unknown safety margin where conveyor fire hazards originally existed. SCANDURA is available now, in varying widths and thicknesses to suit all applications.

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KS12 £474 DELIVERED

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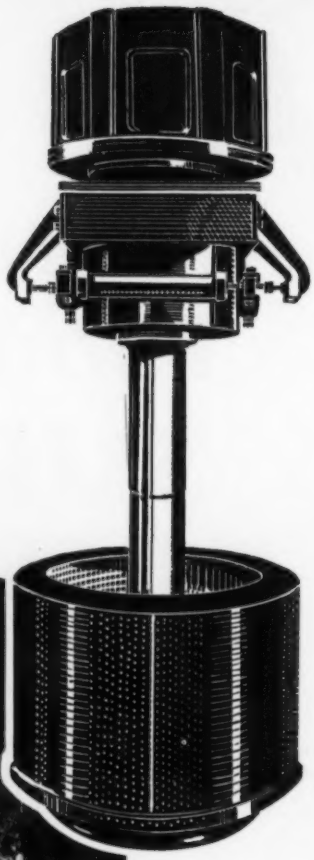

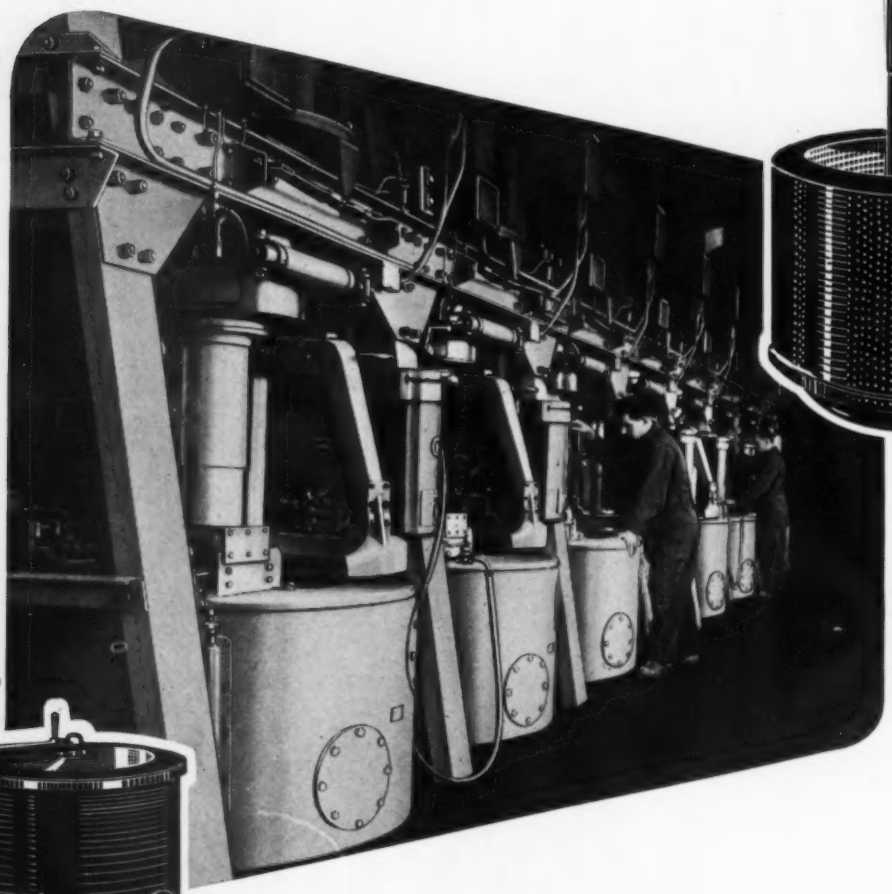

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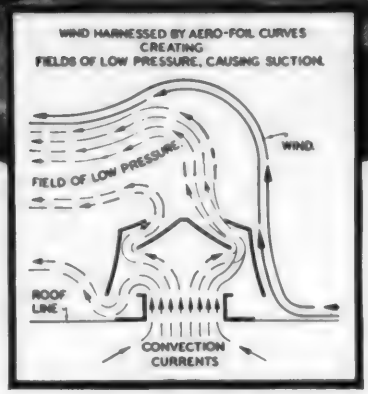
HS.240

Problem No. 6 Condensation and excessive heat.

Condensation is a familiar problem to all connected with the baking industry. Apart from causing discomfort and a loss of efficiency amongst personnel, condensation results in damage to paintwork and the building fabric; it also encourages the germination of undesirable mould growth. However, with Colt *Natural* Ventilation, condensation can be prevented at the same time as excessive heat is removed, providing, in the first place that moisture gains have been accurately measured.

A complete ventilation survey including a site visit and fully detailed report is provided without obligation or charge by the Colt Technical Advisory Service. Our wide experience gained in the ventilation of all types of buildings for over 9000 major industrial and commercial organisations is at your disposal.

Whatever your problem, be it heat, fumes, smoke, steam, or condensation, Colt can cure it.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WIND
FIELD OF LOW PRESSURE
ROOF LINE
CONVECTION CURRENTS

Above is a sectional view of the Colt SR type ventilator often used in bakeries. Without any of the disadvantages of noise, wear and tear, maintenance or running costs, one of these ventilators can provide continuous positive extract at a rate of 400,000 cubic feet per hour.

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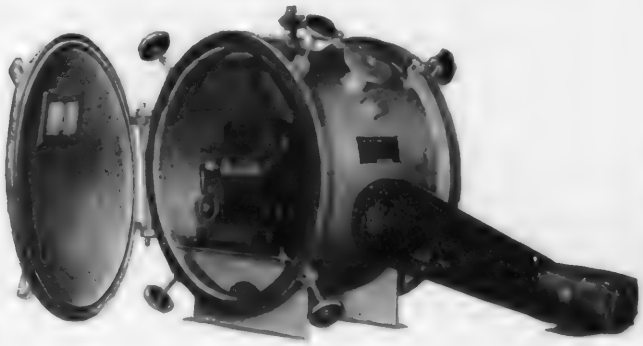
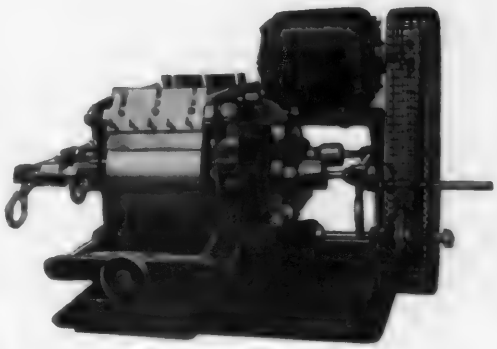
Branches at: Birmingham, Bradford, Bridgend (Glam.), Bristol, Coventry, Dublin, Edinburgh, Glasgow, Liverpool, London, Manchester, Newcastle-upon-Tyne, Sheffield, and Warwick.

Agents in: Australia, Belgian Congo, Canada, Cyprus, India, Indonesia, Madagascar, Malaya, Mauritius, New Zealand, Pakistan, Portugal, North and South Rhodesia, and South Africa.

G. 357

Mitchell SMALL SCALE FILM DRUM DRYERS





The Mitchell Small Scale Film Drum Dryer has been specially designed for the drying of pasty and colloidal materials, suspensions, liquids, etc., direct from the liquid or semi-fluid state to a final dry powder or flake.

Many firms having such a drying problem to contend with have found one of these small units of great service for carrying out tests and trials under their own control and, for the investigation of new products, in secrecy—thus enabling samples of the product to be available for market reports and sales purposes.

The Dryers are supplied with double drying drums 6″ diameter x 6½″ long, either of mild steel or stainless steel fitted with special doctor knives for cutting off the dried material. The speed of the drum revolutions can be varied within limits so that the drying time can be lengthened or shortened according to the materials being handled. The wet material is fed between the drying cylinders, which rotate and dry the product during its travel over the surface, the dried flake or powder falling into a trough underneath.

The drying can be done under atmospheric drying conditions, but in order to widen the scope of the machine for handling heat-sensitive materials or products which necessitate special drying conditions, we supply a cylindrical vacuum casing into which the Drum Dryer can be inserted and the drying carried out under vacuum. We also provide the necessary vacuumising set for Research Stations not fitted with vacuum main.

The Small Film Drum Dryer is mainly used where it is desired to produce a finished dry powder or flake without filtration, handling or labour, and is therefore recommended for products which are difficult to filter. It can also be used for handling precipitates where it is desired to eliminate filtration and handling.

These Dryers are installed in such process industries as Starch and Dextrine, Plastics, Chemicals, Fine Chemicals and Drugs, Soap, Foodstuffs, etc., etc., and can also be adapted for chilling and flaking purposes.

Enquiries also invited for Large Scale Film Drum Dryers, Flaking Machines and Chilling Rolls up to 4′ diameter x 10′ long. We invite you to write for details of our full range.

L. A. MITCHELL LTD., 37 PETER STREET, MANCHESTER 2.

MDDX

THE NEW MIKRO-BUD

VERTICAL HAMMER MILL WITH BUILT IN AIR CLASSIFIER

Particle sizing can be changed in seconds while the machine is in operation.

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10°F. Maximum temperature rise.

Products ground to 300 mesh B.S.S. and finer.

Easy to dismantle and clean.

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"The casing that breathes"

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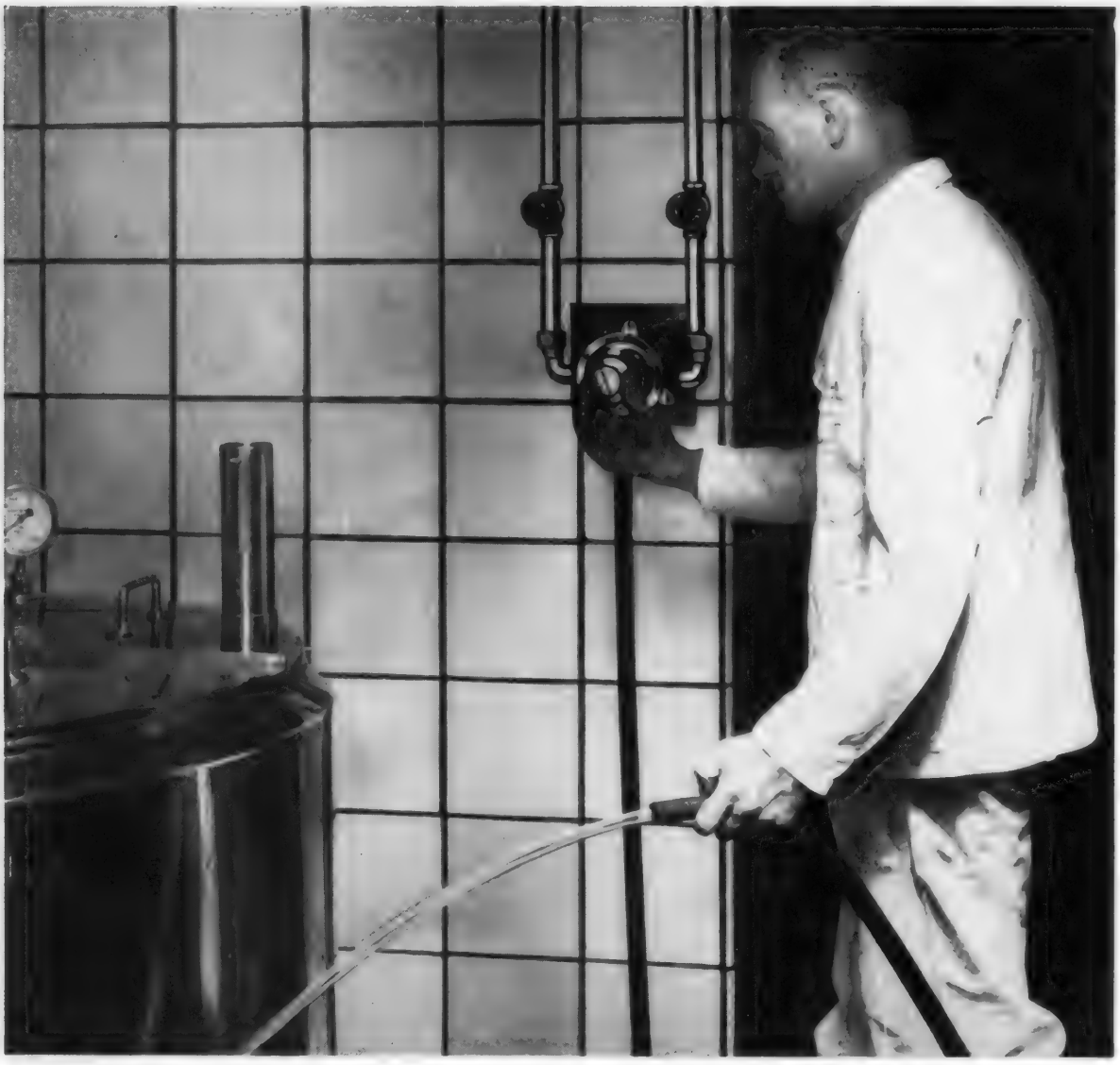
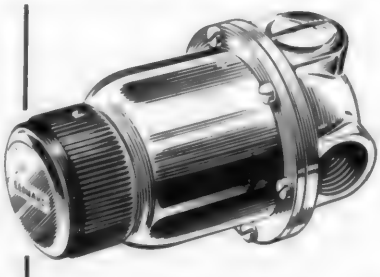


Instant hot water from steam and cold . . .

The best way of getting hot water is to mix steam and cold through a Leonard thermostatic steam water heater.

You get a steady stream of warm water at any temperature you like up to 200°F or even higher, adjustable instantly by turning a knob. The thermostat keeps the temperature steady within a very few degrees.

Saves heat, saves water, saves a raft of equipment. More about it, with lists of users, in leaflet No. H/9.



Leonard

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PATENTED

WALKER, CROSWELLER AND CO. LTD., CHELTENHAM

Telephone: Cheltenham 56317

pHact or fetish?

THERE'S A REASON FOR BEING SAVAGE...

"Never heard of pH?" we echoed, rapidly losing faith in the Witch Doctor, "No wonder the savages are savage!"

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Have you a pHobia about pH?

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the bitter 'bite' of yeast with

Super GradeYEATEX

Using a new de-bittering process, we have eliminated the bitter, yeasty bite from yeast extract whilst retaining its nutritional value and vitamins of the B Complex in their correct balance. *Super Grade* Yeatex—as we have very properly called this improved extract—has a delicate aroma and flavour and is smooth and irresistible to the taste. By adding a subtle piquancy to many products it dispenses with synthetic flavourings. The finest yeast extract obtainable, *Super Grade* Yeatex has a place in many foods. Has it one in yours? We'll be happy to advise you.

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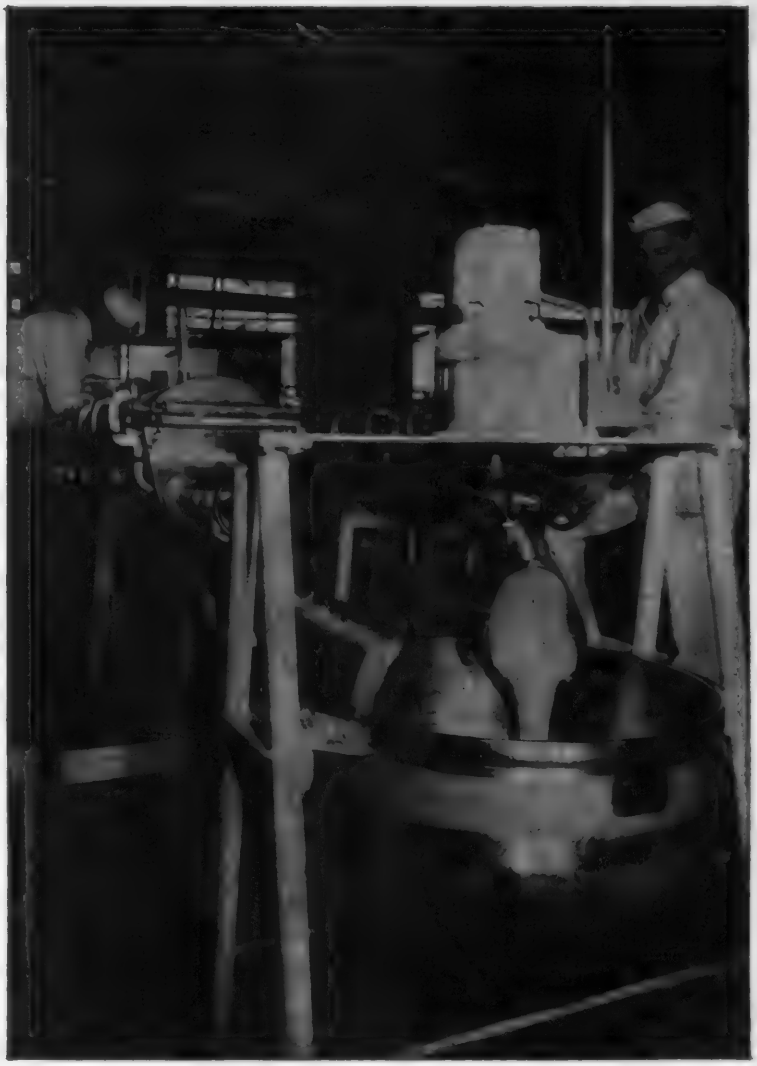

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STAINLESS STEEL

. . . *safeguards your health*

In the preparation of foodstuffs, scrupulous attention to cleanliness is essential. That is why this modern plant for the production of cheese makes extensive use of stainless steel for all metal parts in contact with the product. Freedom from contamination and ease of cleaning are two of its main advantages.

Burnett & Rolfe Cheese Cookers, photographed in natural colour by courtesy of Kraft Foods Ltd., Hayes, Middlesex.

The metal of the age

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SAMUEL FOX & COMPANY LIMITED

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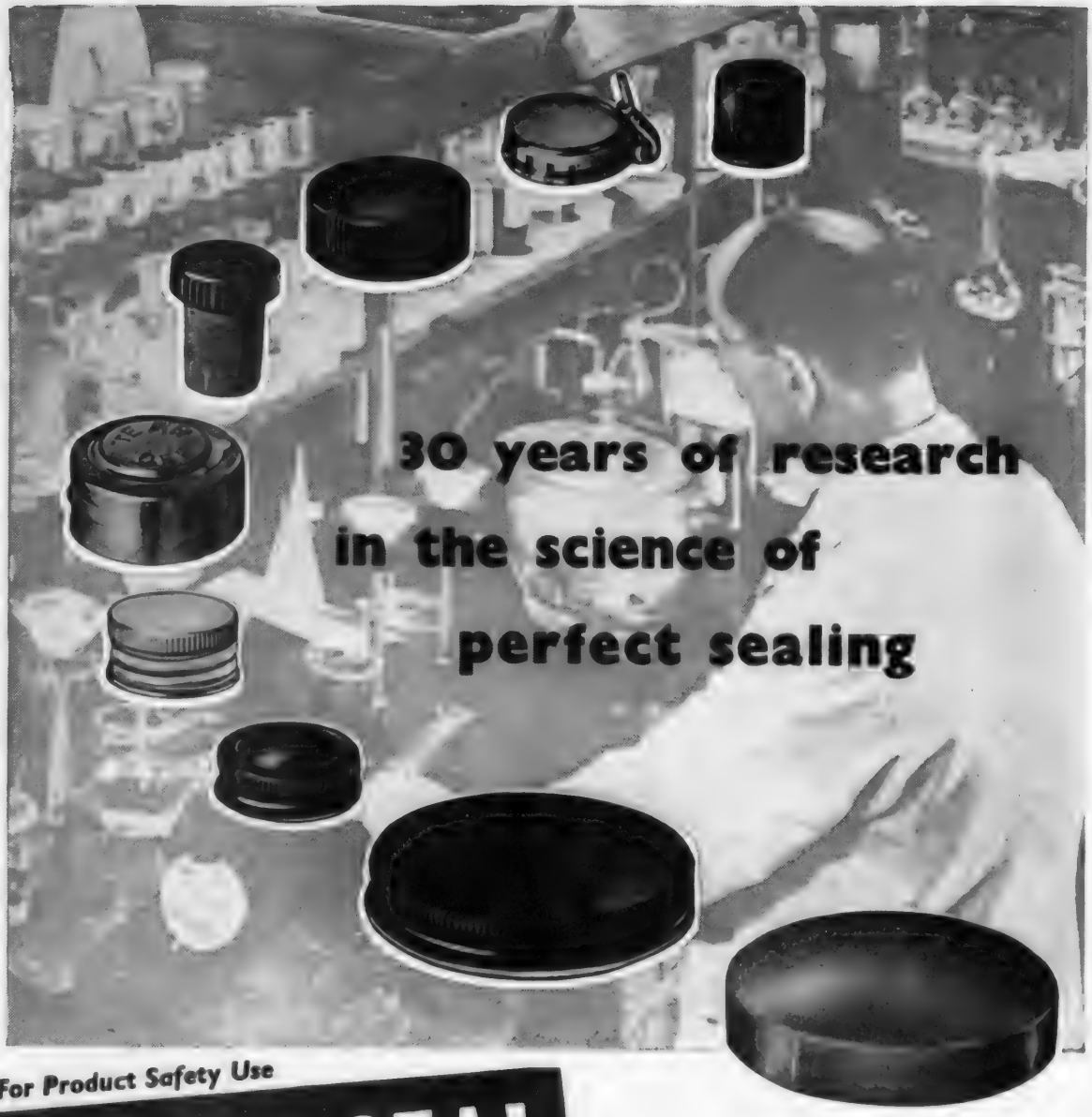

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WITH UGB GLASS CONTAINERS

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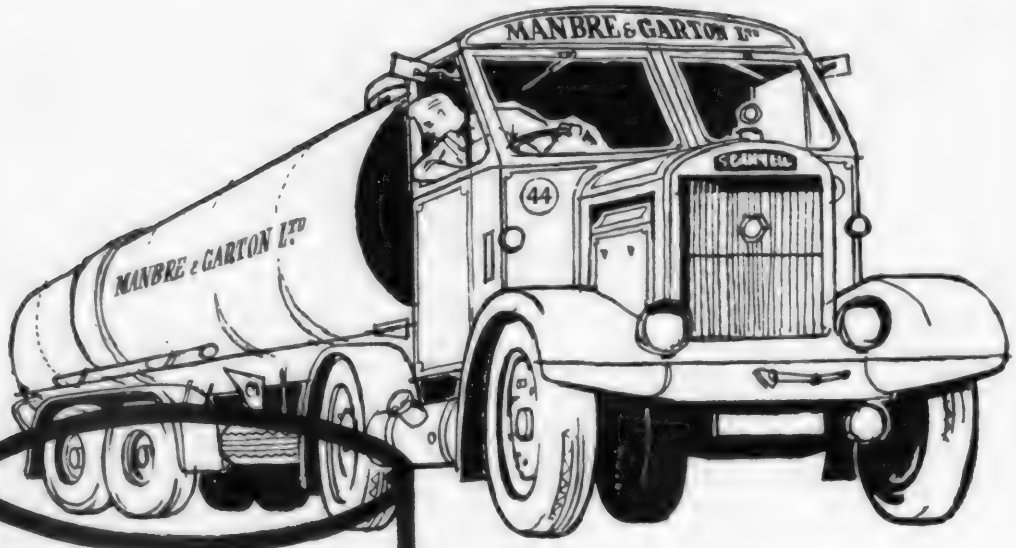

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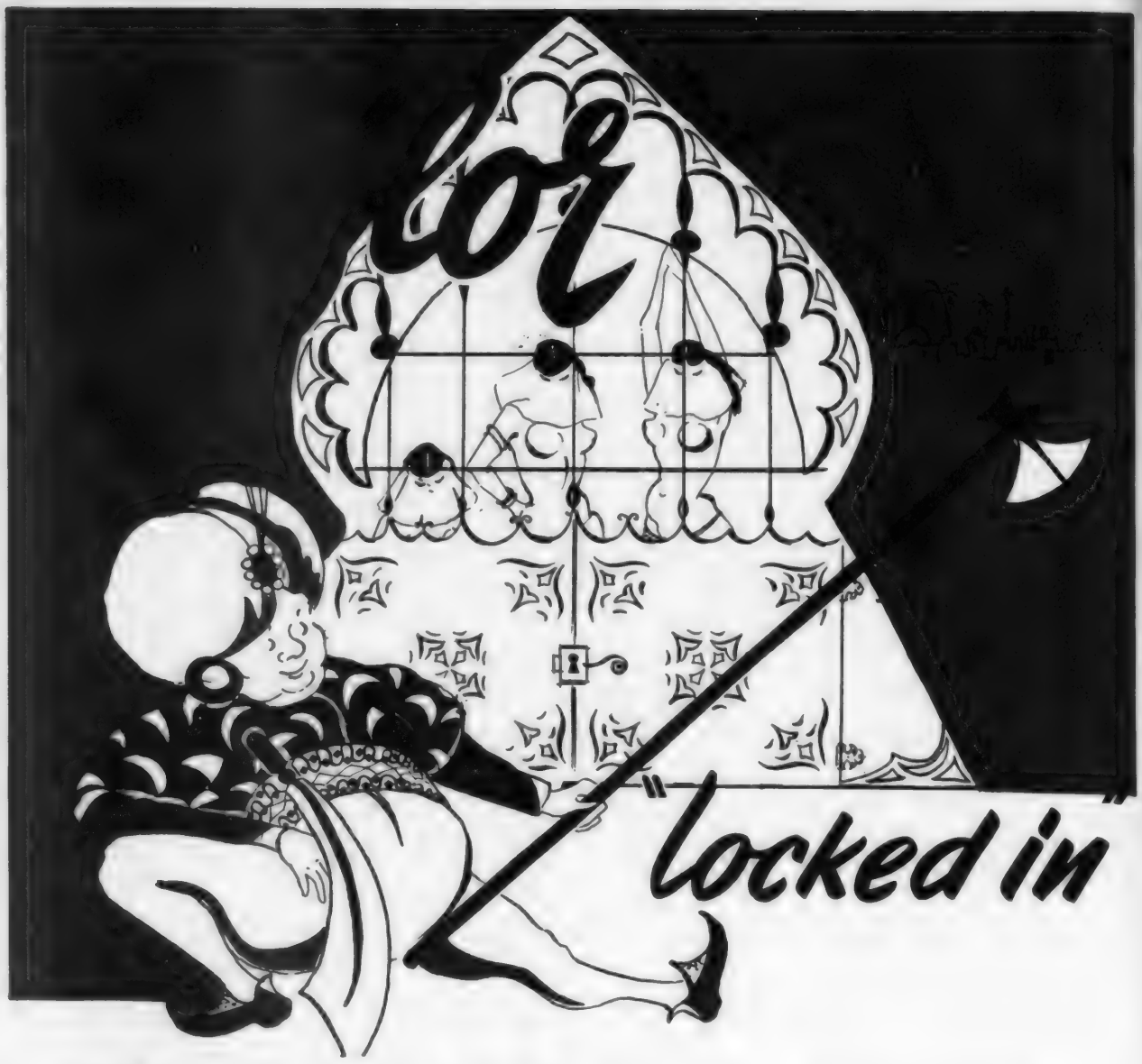
...the R.O. seal



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5 PROVED ADVANTAGES:

- ★ Ease of incorporation in dry mixes.
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- ★ Wide range of raw materials are compatible with this medium.
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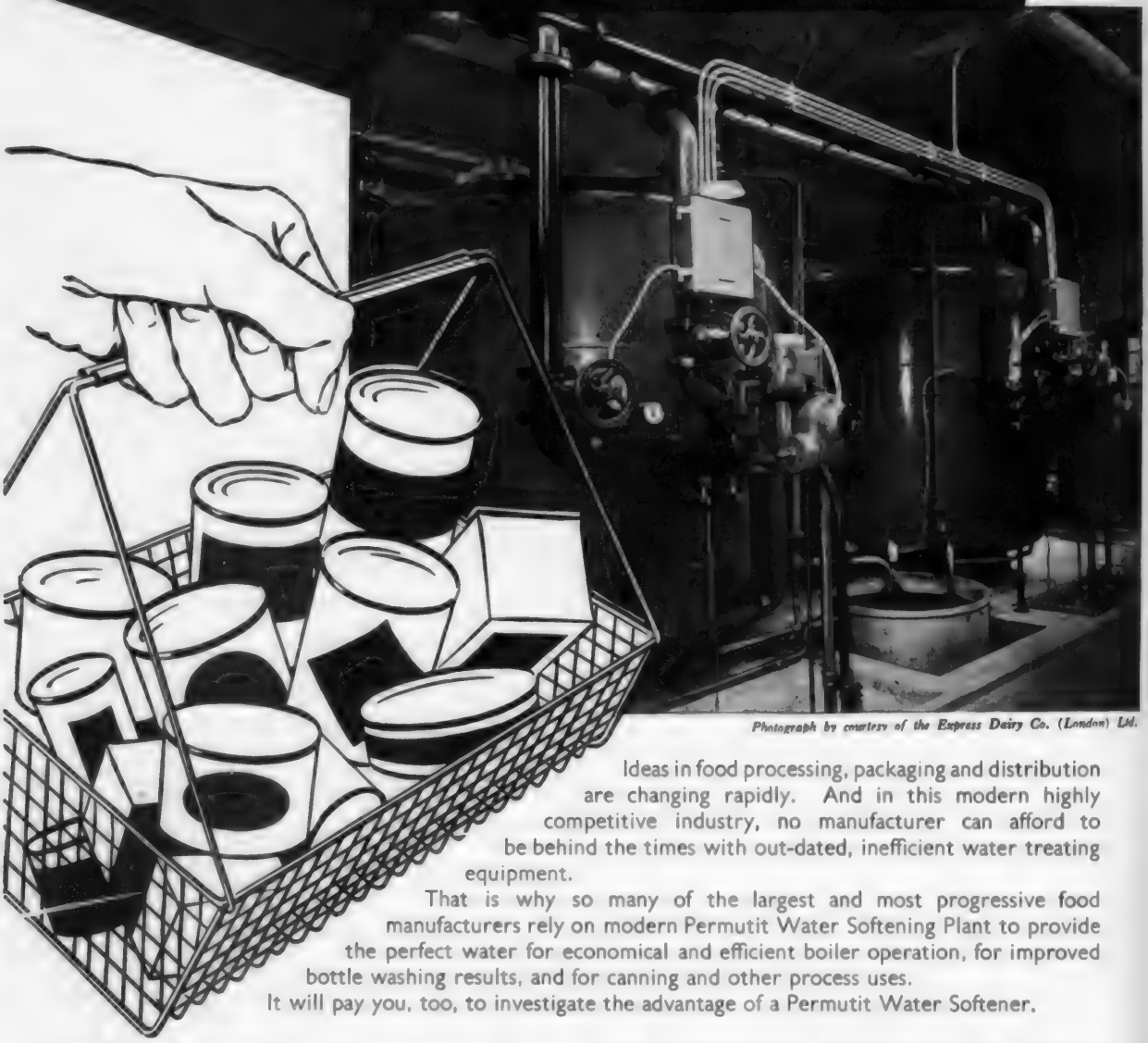
WATER TREATING PLANT SERVES THE MODERN FOOD INDUSTRY



Photograph by courtesy of the Express Dairy Co. (London) Ltd.

Ideas in food processing, packaging and distribution are changing rapidly. And in this modern highly competitive industry, no manufacturer can afford to be behind the times with out-dated, inefficient water treating equipment.

That is why so many of the largest and most progressive food manufacturers rely on modern Permutit Water Softening Plant to provide the perfect water for economical and efficient boiler operation, for improved bottle washing results, and for canning and other process uses.

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QUALITY in White Flint GLASS CONTAINERS

First Class in GLASS

NATIONAL GLASS WORKS (YORK) LTD.
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ALSO AT 105 HATTON GARDEN, LONDON, E.C.1
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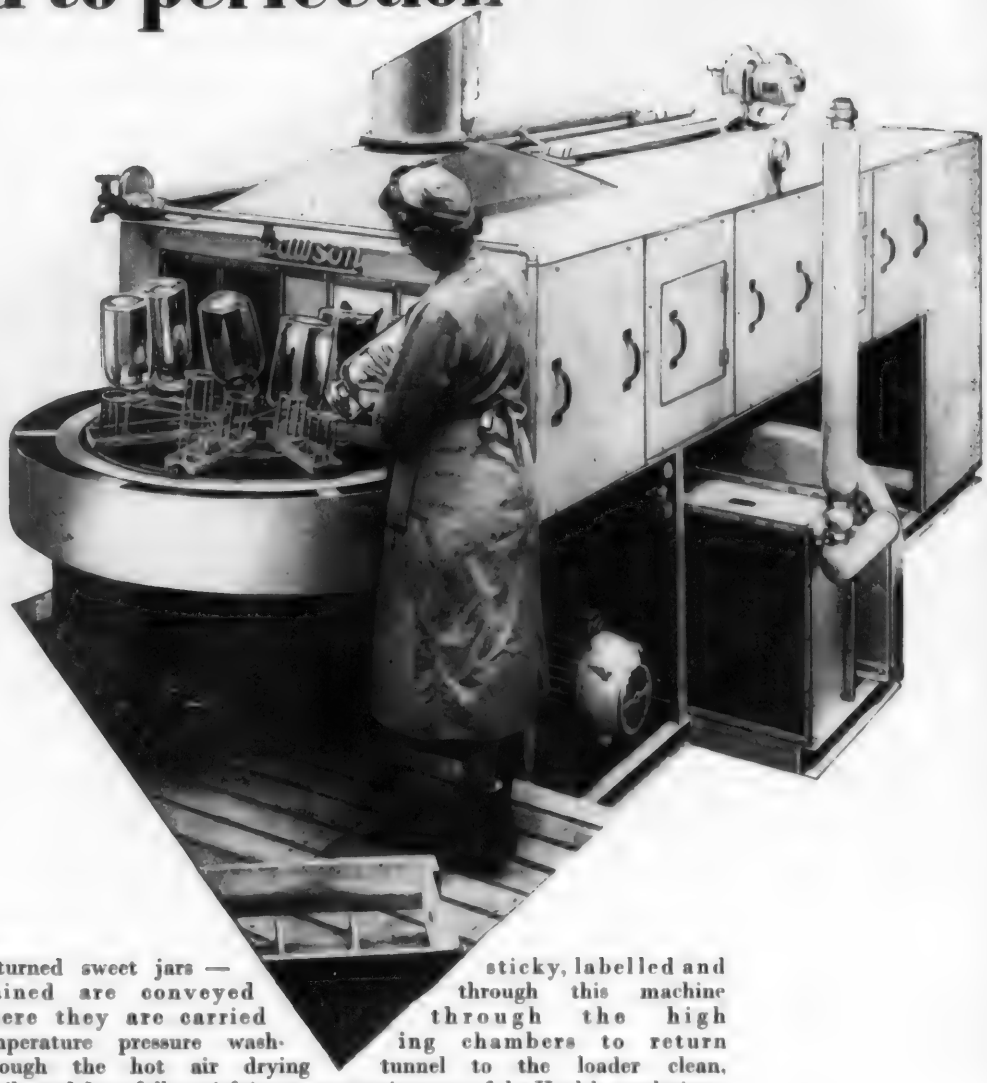
★ Packed in easily handled cartons

Jars for Confection washed to perfection



Returned sweet jars — sticky, labelled and stained are conveyed through this machine where they are carried through the high temperature pressure washing chambers to return through the hot air drying tunnel to the loader clean, sterile, and dry—fully satisfying every requirement of the Health regulations. This is but one of hundreds of washing problems Dawson machines handle quickly, safely and economically. If you wash tins, trays, jars, bottles, moulds, utensils or dishes Dawsons can be of good service to you.

Washing Plant for
BISCUIT TINS
BAKERS' TRAYS
FISH BOXES
BOTTLES & JARS
DISHES
ROAD VEHICLES

The machine illustrated washes 5 lb. convex jars at 3/400 jars per hour.

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MALT FLOUR

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Use electricity and bring the heat to the job instead of having to bring the job to the heat. Heat can be applied wherever it is possible to bring a pair of wires—and so the heating process can be right in the line of production.

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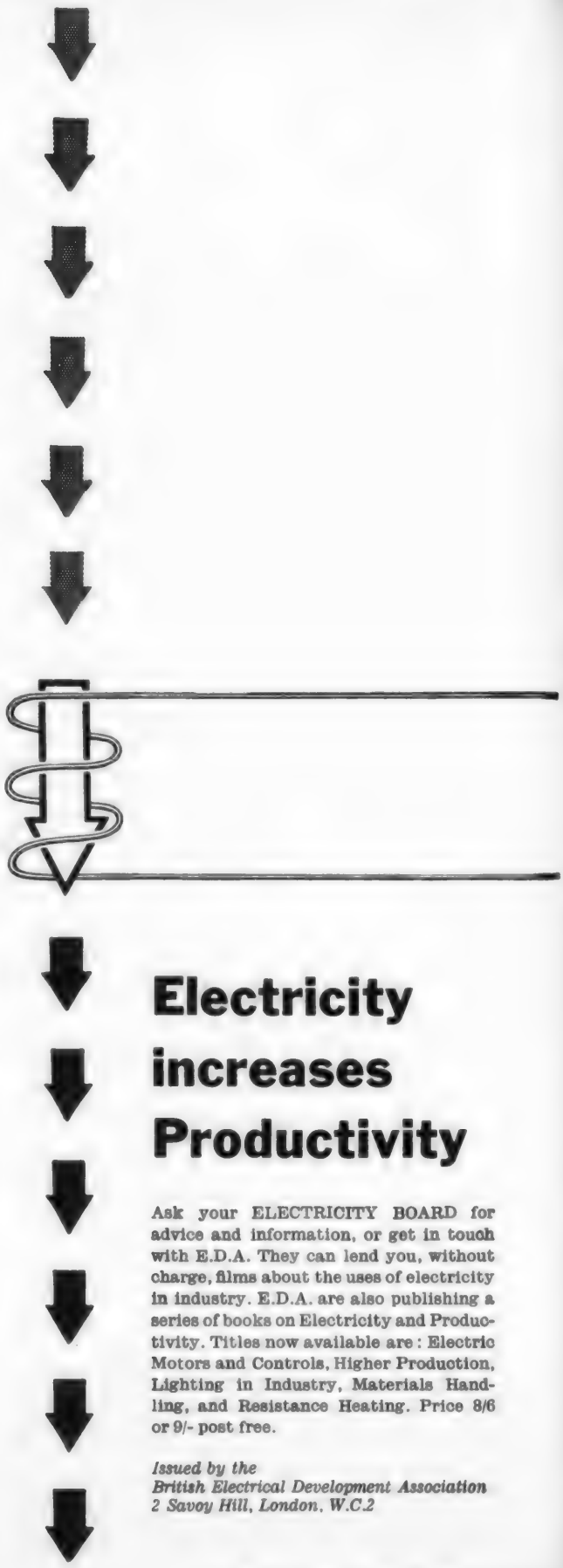

Electricity increases Productivity

Ask your ELECTRICITY BOARD for advice and information, or get in touch with E.D.A. They can lend you, without charge, films about the uses of electricity in industry. E.D.A. are also publishing a series of books on Electricity and Productivity. Titles now available are: Electric Motors and Controls, Higher Production, Lighting in Industry, Materials Handling, and Resistance Heating. Price 8/6 or 9/- post free.

Issued by the
British Electrical Development Association
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Summing up on the sliding-shoe pump

Self-priming, high suction lift, constant capacity at varying heads, self-compensation for wear, accessibility, supreme simplicity . . . As you tick off these points, you make the case for the Megator sliding-shoe pump. The only moving parts are the rotor and the three rubber-lined plastic shoes. Handling most liquids, Megator pumps will outwork and outlast any other. You certainly should find out more about them.

SOME MEGATOR FACTS

***High suction lift** permits installation in convenient positions.*

***Self-priming** inherent without any added device.*

***"Snoring"** ability sucks out the last drop.*

***Constant capacity** at varying pressures.*

***Sustained performance** Self-compensating for wear.*

***Simple.** designed for easy maintenance.*

***Capacities** from 4 to 250 galls. per minute.*

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"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them.

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ANCHOR STEEL PLATES, STEEL CLAD FLAGS AND RAFTS.

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SYMBOLIZES
"CLEANING IN PLACE"

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CAPACITIES to 10,000 Imp. Galls. per hour.

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Capacities up to 1,000 Imp. Galls. per hour according to product. Available completely in stainless steel if required.

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There is a Sellers Unit to eliminate every cleaning problem in any plant where cold water and steam of 50 lb. p.s.i. or more is available.

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These are specially designed units for maximum heat recovery and fuel economy purposes.

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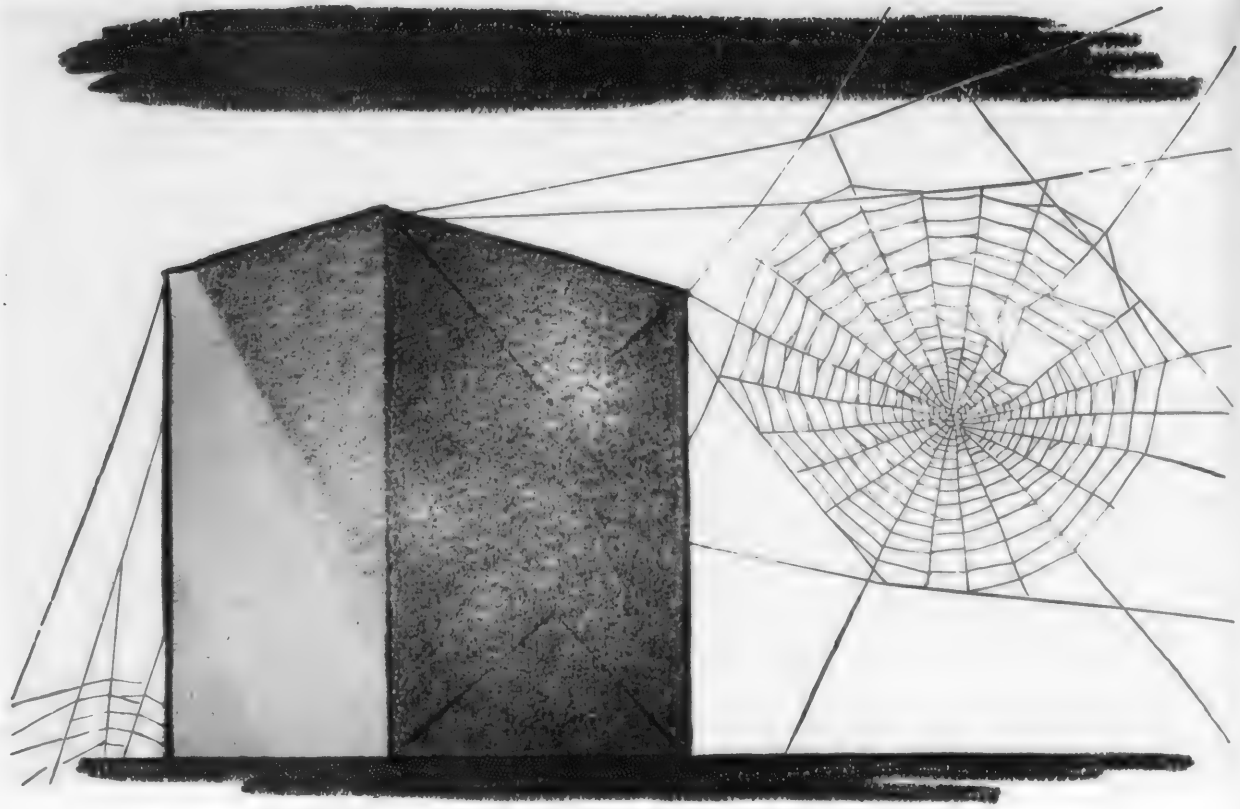

Yet it's factory fresh the day that it's opened!

Put your product in a Telcothene package—and it's safe from bad storage. Safe from dirt and damp. Safe from chemical contamination. And safe for a long long time.

Telcothene coated papers make perfect hermetically sealed inner wrappings for foodstuffs and perishable goods. In addition their toughness makes them very suitable for use in the manufacture of moisture proof outers, as instanced by multiwall paper sacks, fibre board drums, cartons and similar containers. The cost is not high; the results in terms of prestige and customer goodwill are rewarding indeed.

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..it's Telcothene packed!

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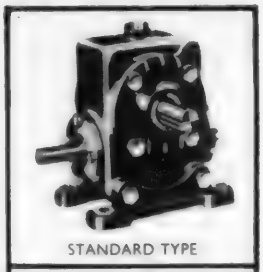
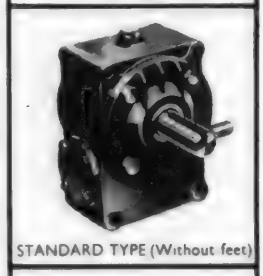
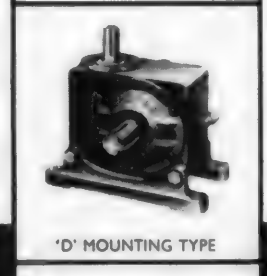
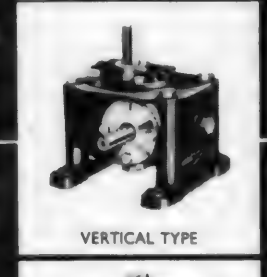
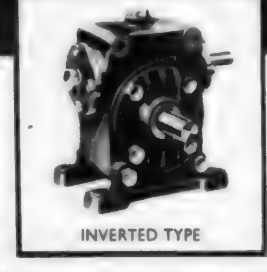
Crofts universal mounting worm reduction gears


STANDARD TYPE

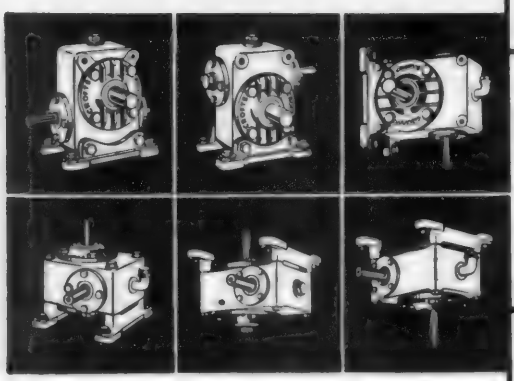

STANDARD TYPE (Without feet)

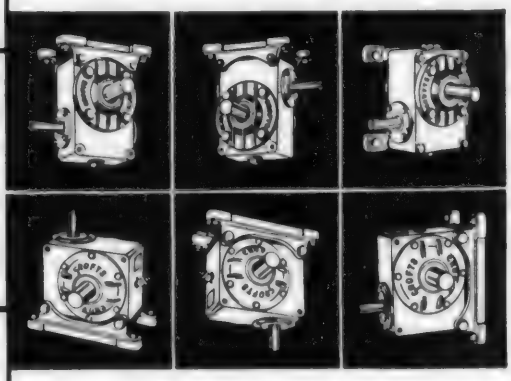

'D' MOUNTING TYPE


VERTICAL TYPE


INVERTED TYPE

Using any of the three foot designs or by bolting the basic gear without feet directly on to your machinery you can get any mounting position you like with this truly universal mounting worm reduction gear. Any size is available as a complete worm geared motor.





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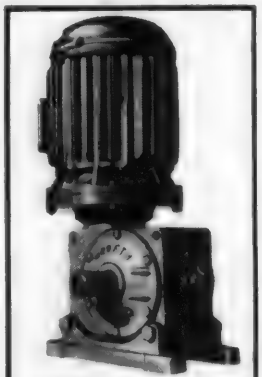
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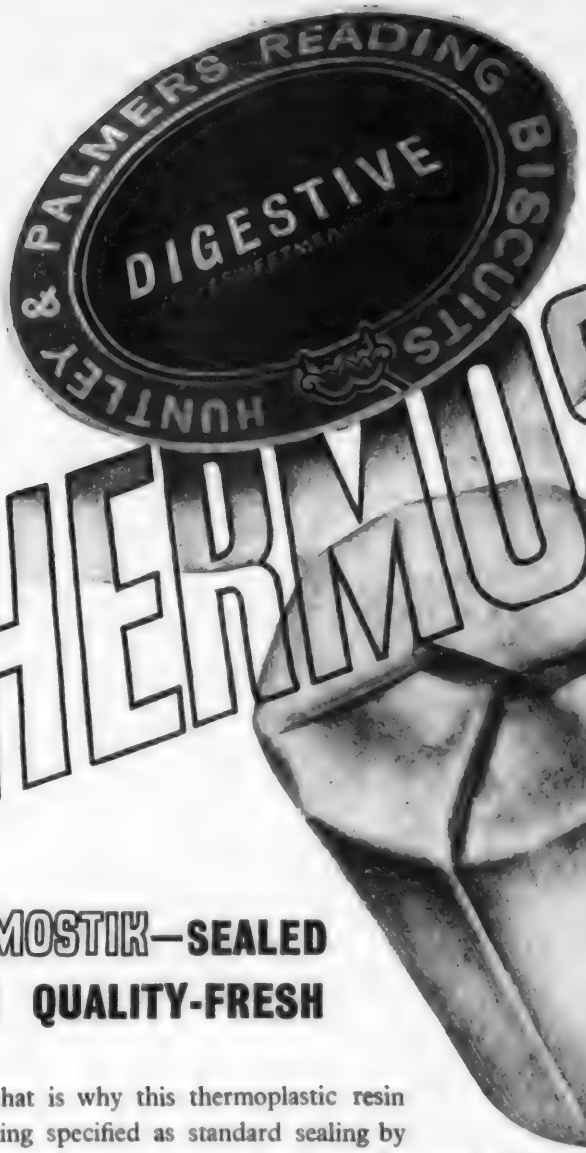

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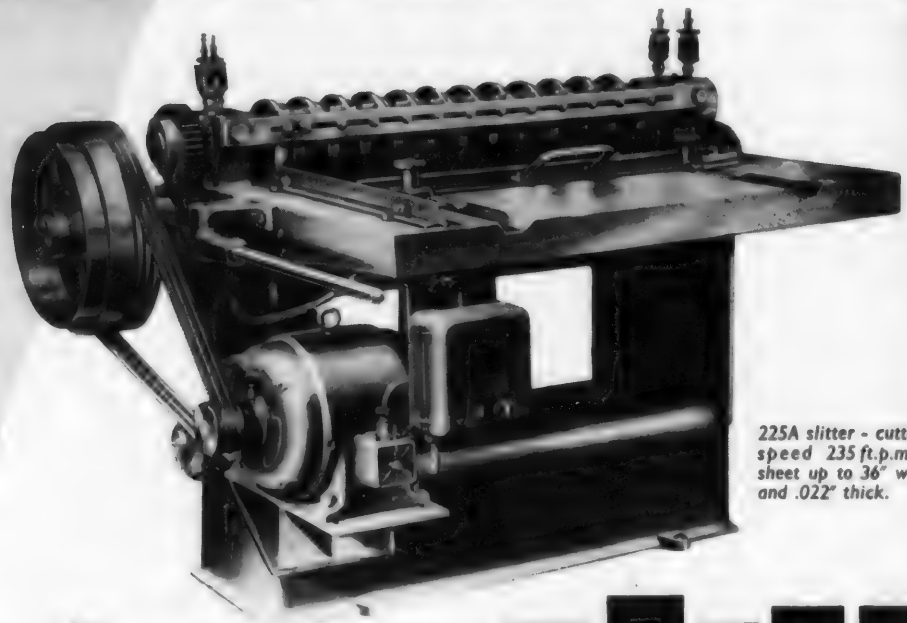

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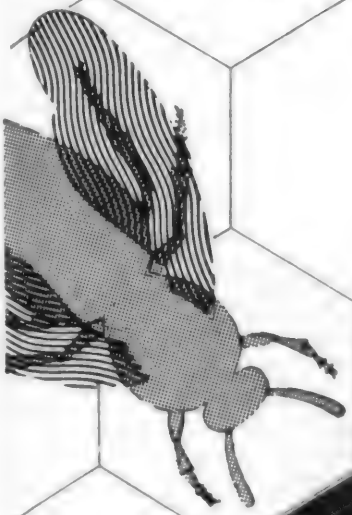

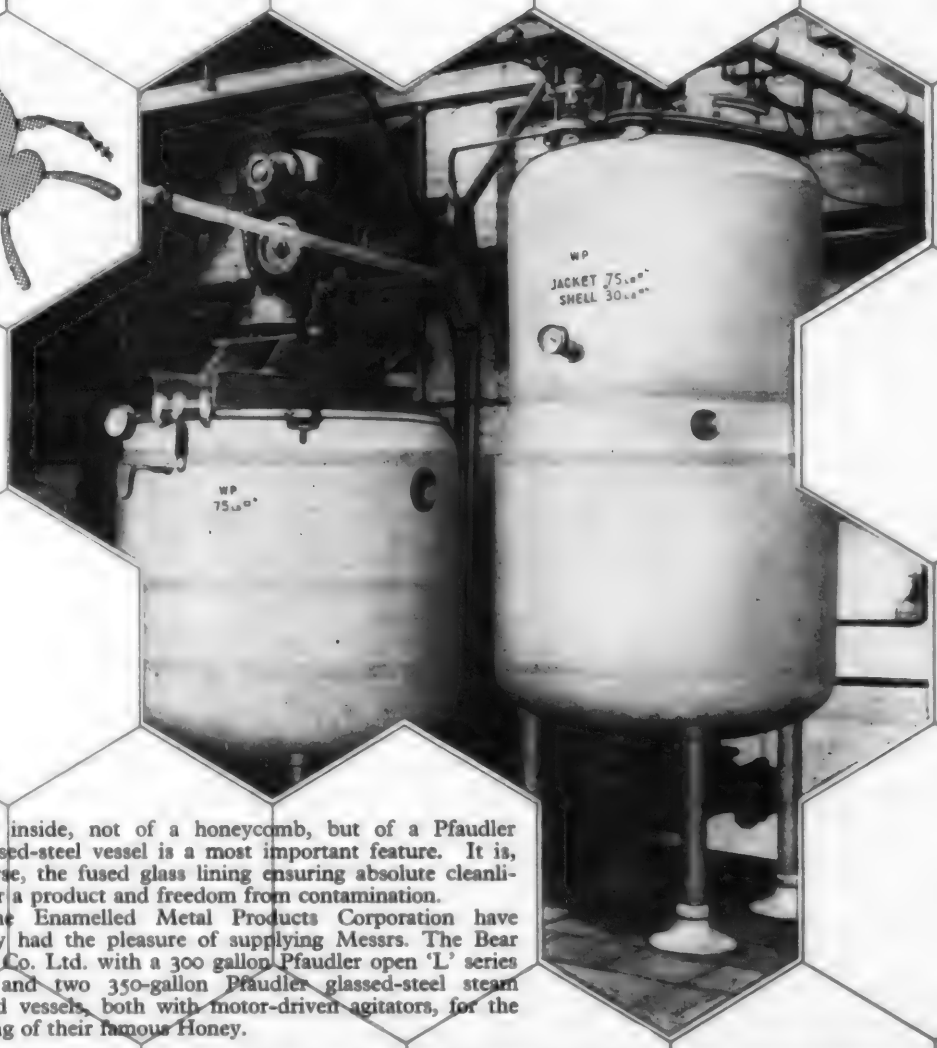

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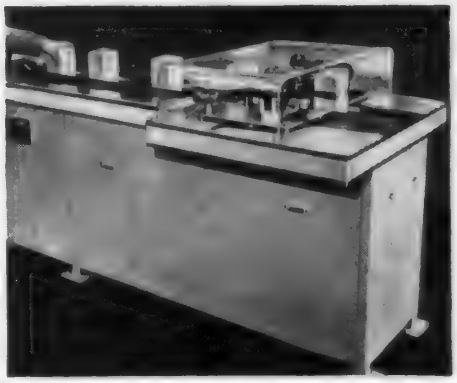

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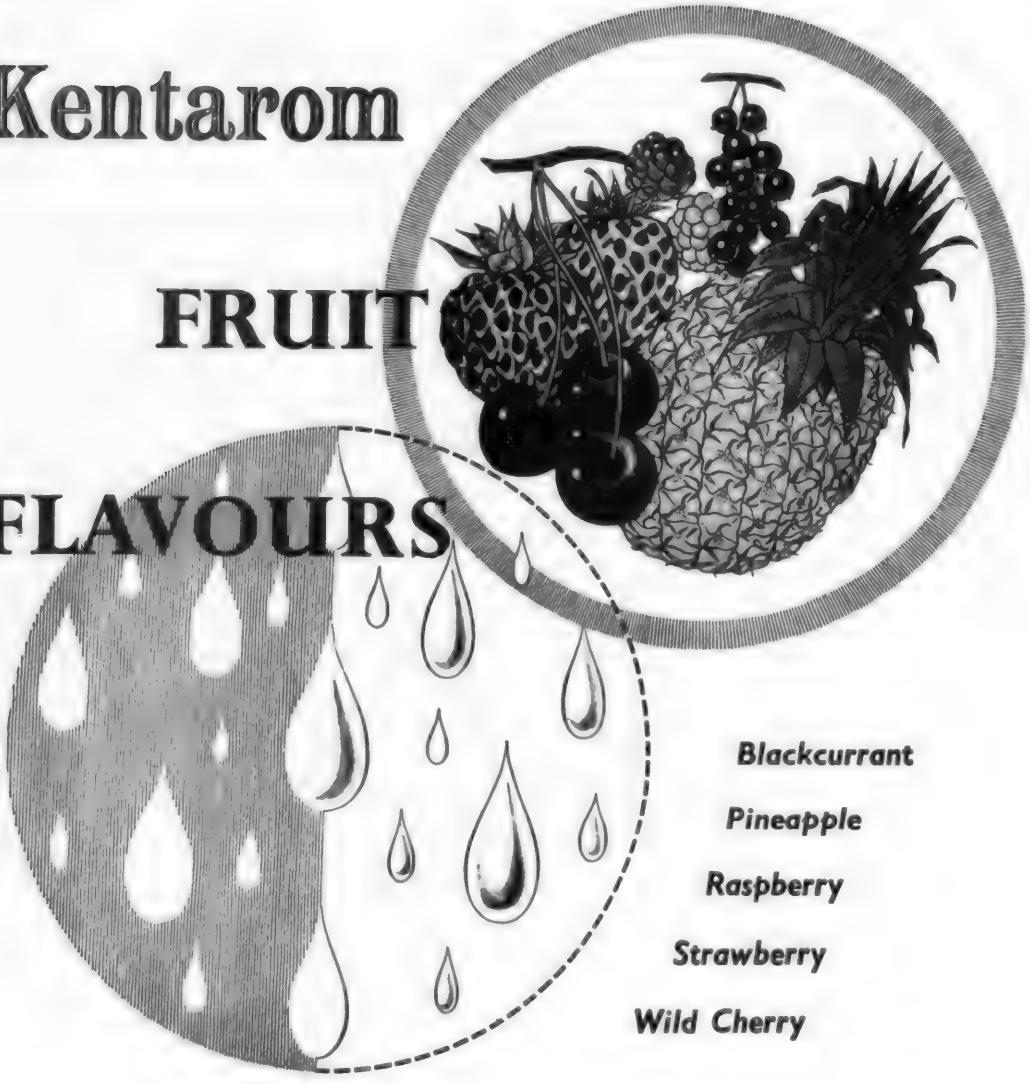

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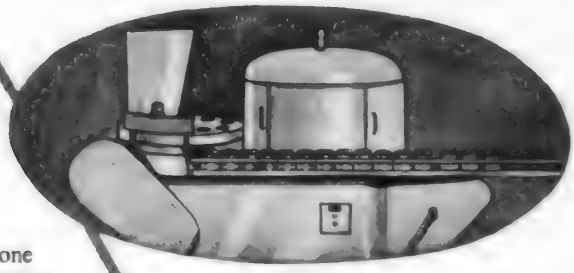

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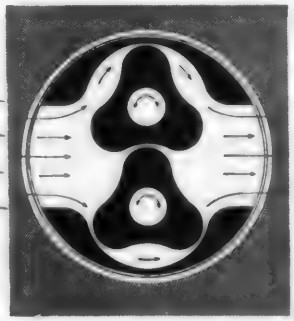

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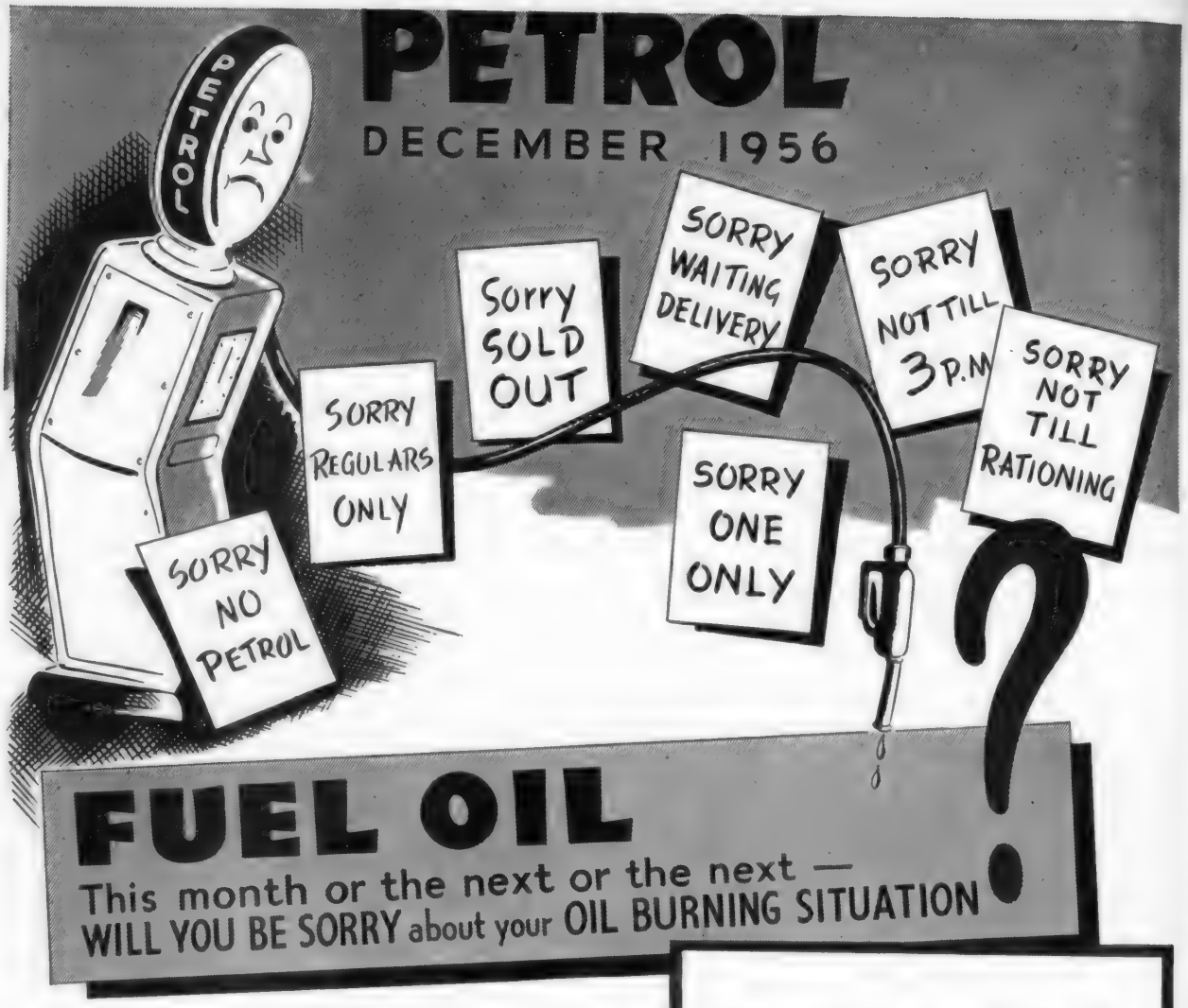

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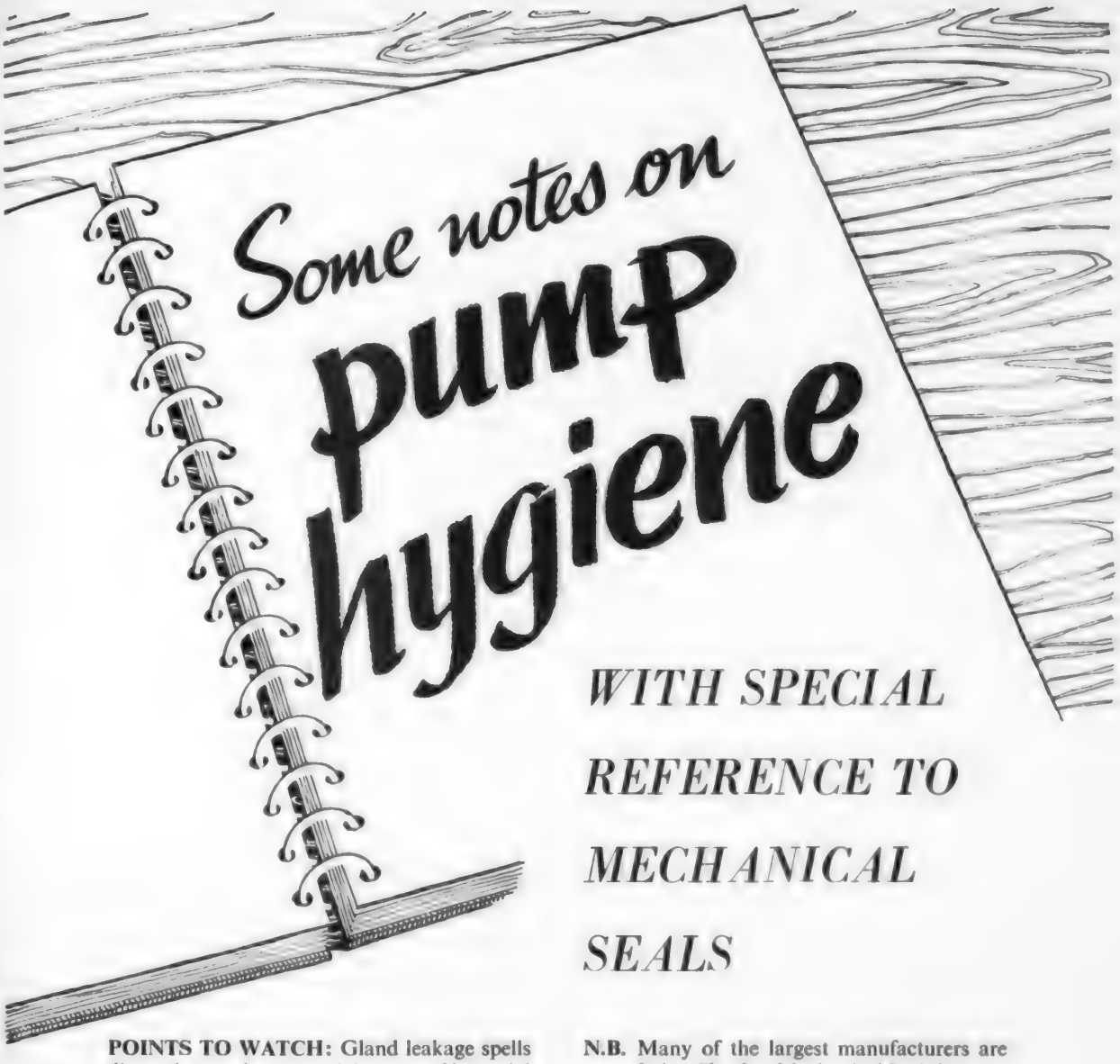

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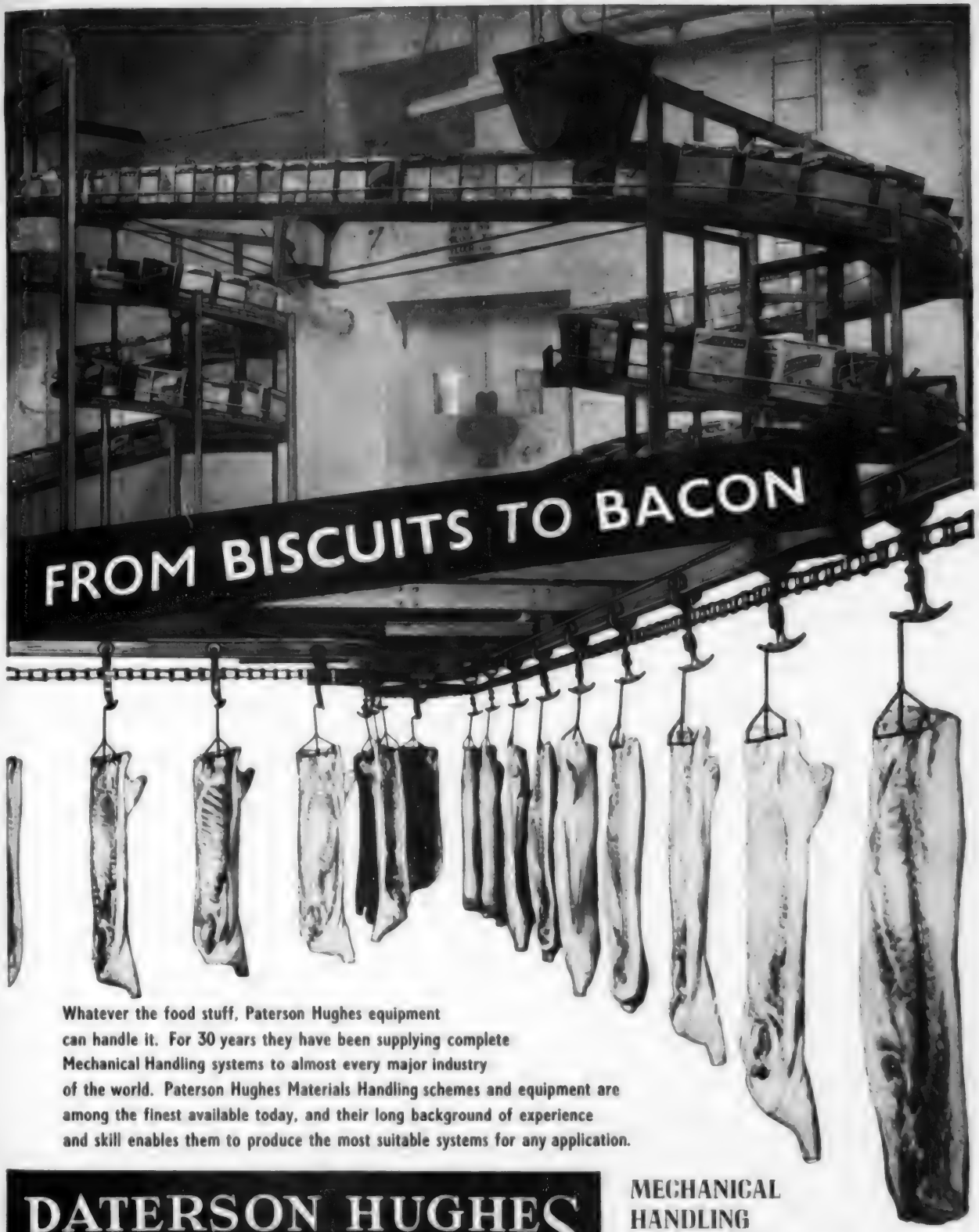

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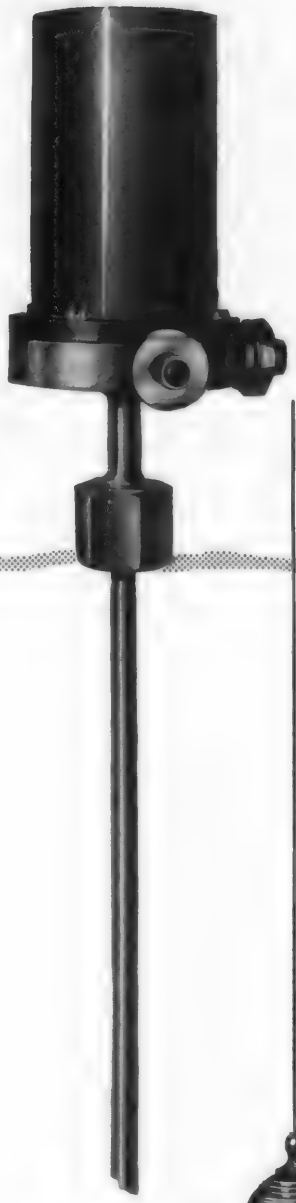

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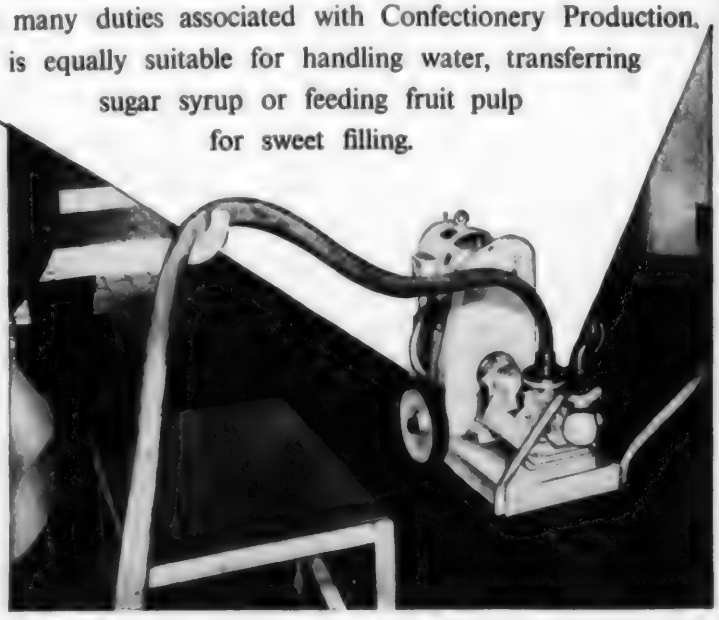

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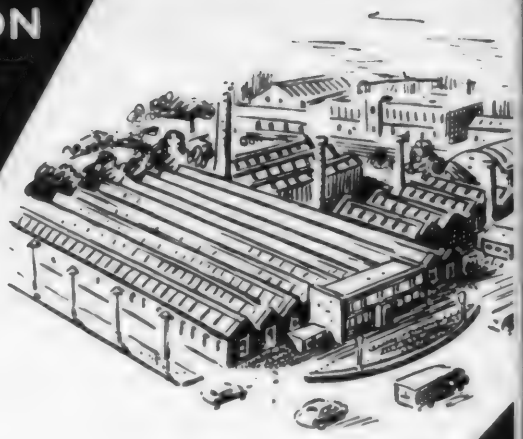

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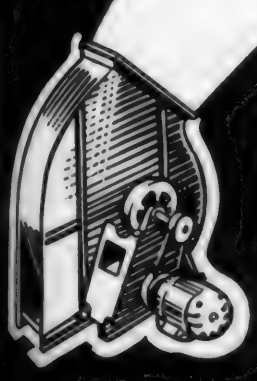

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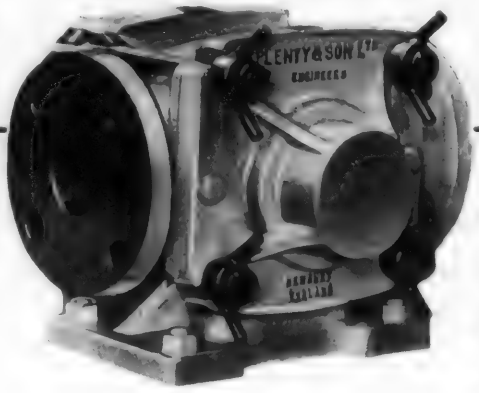

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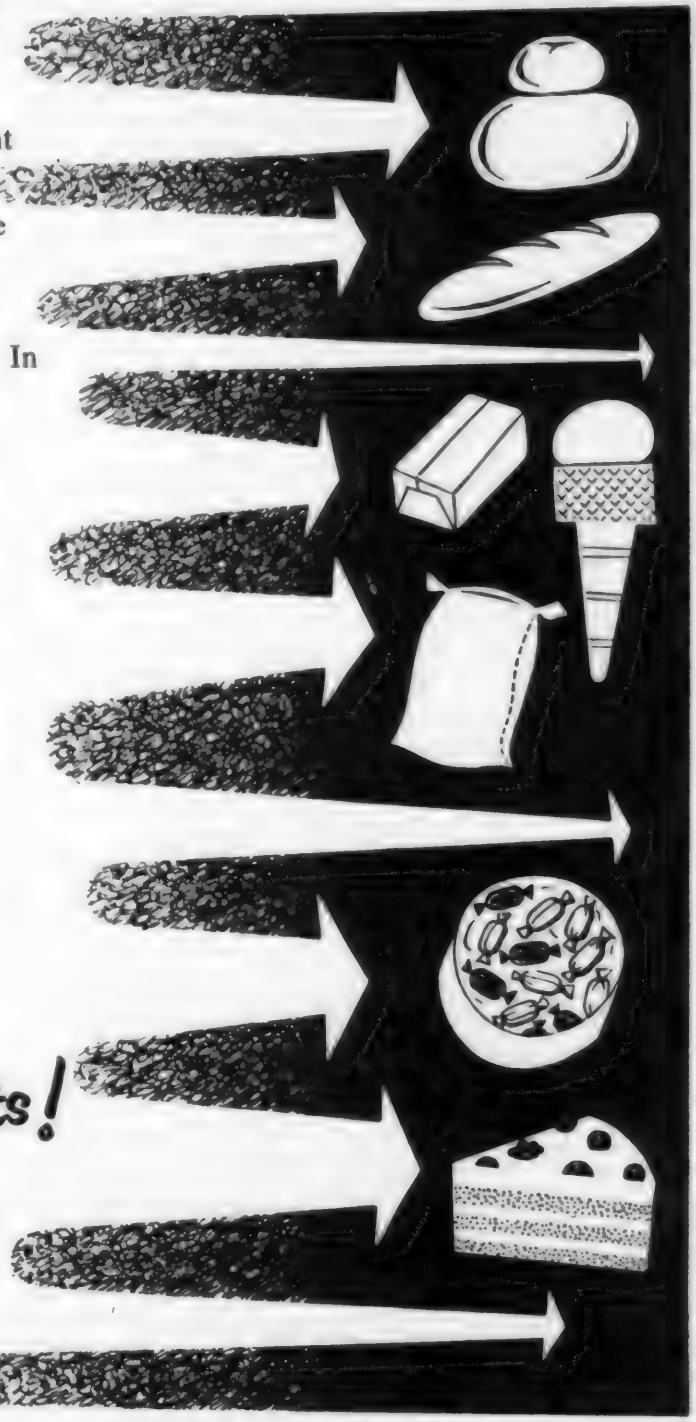

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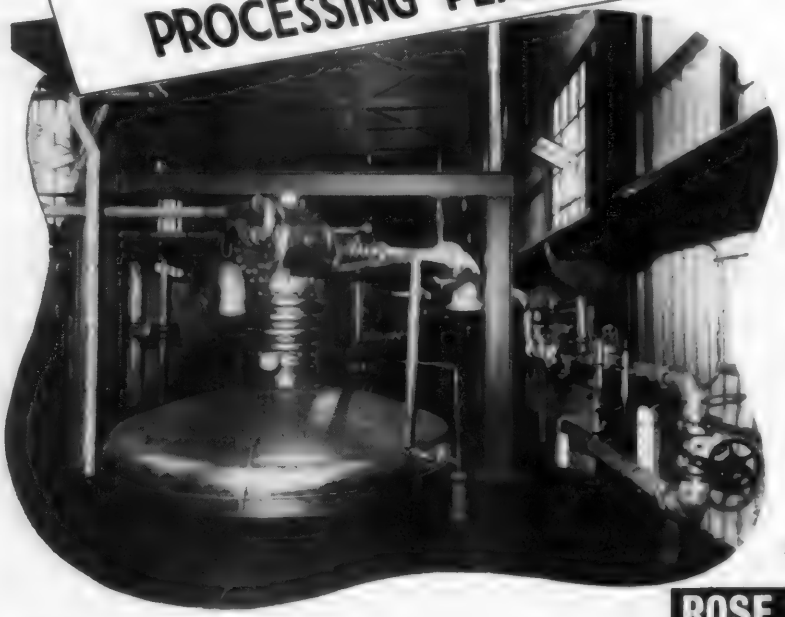

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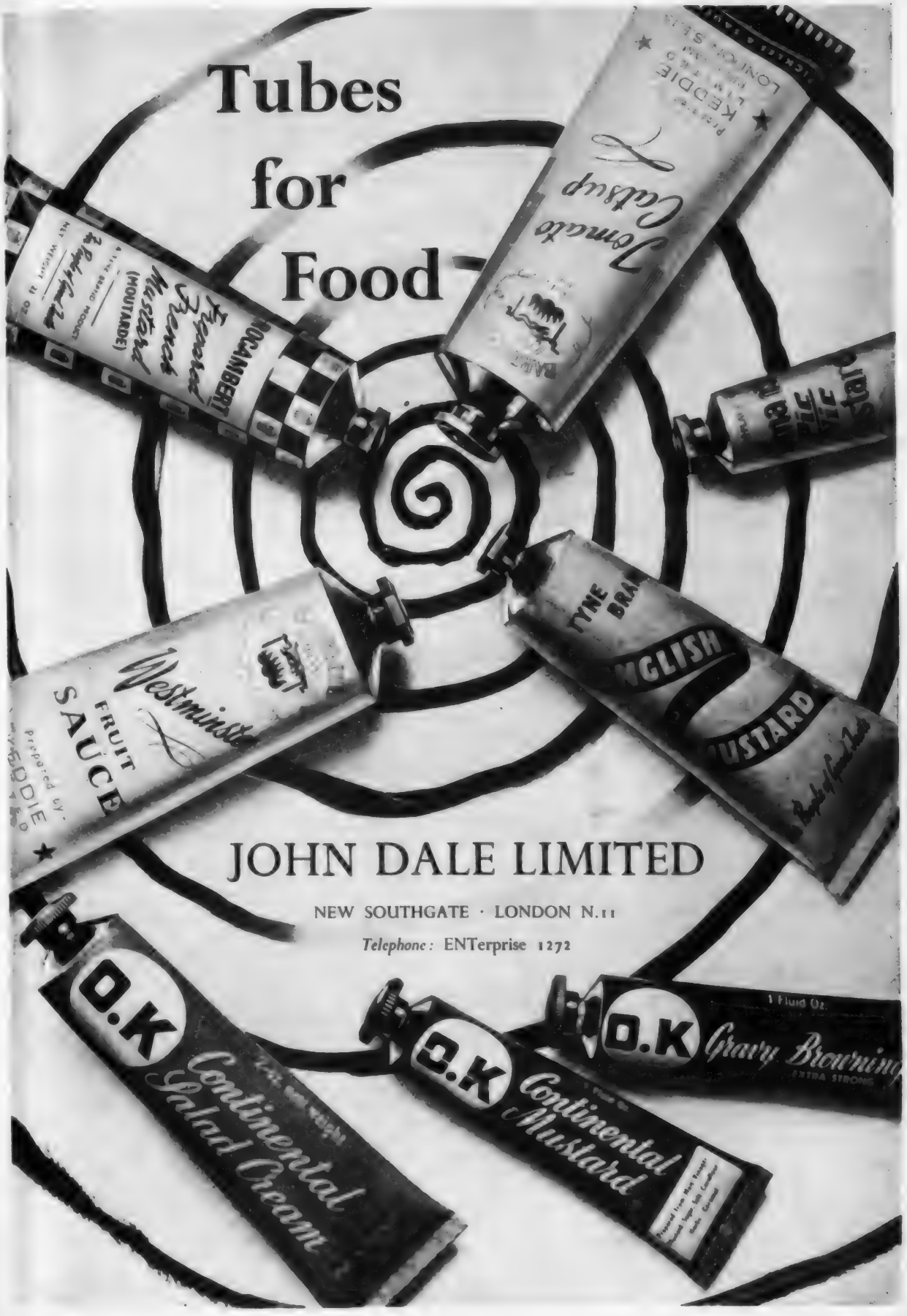

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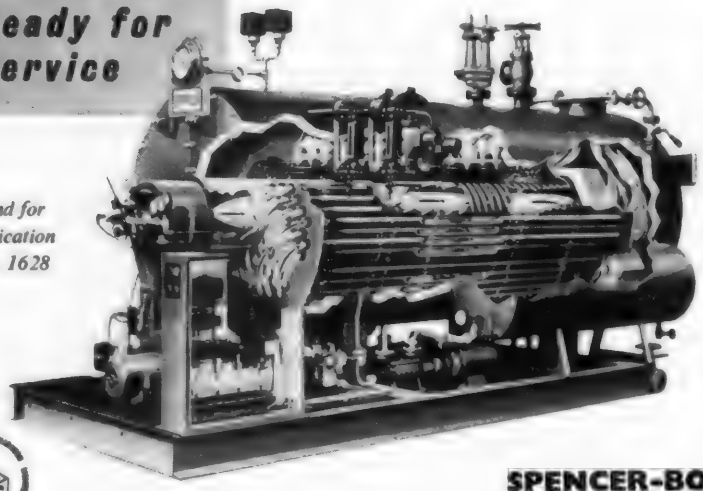

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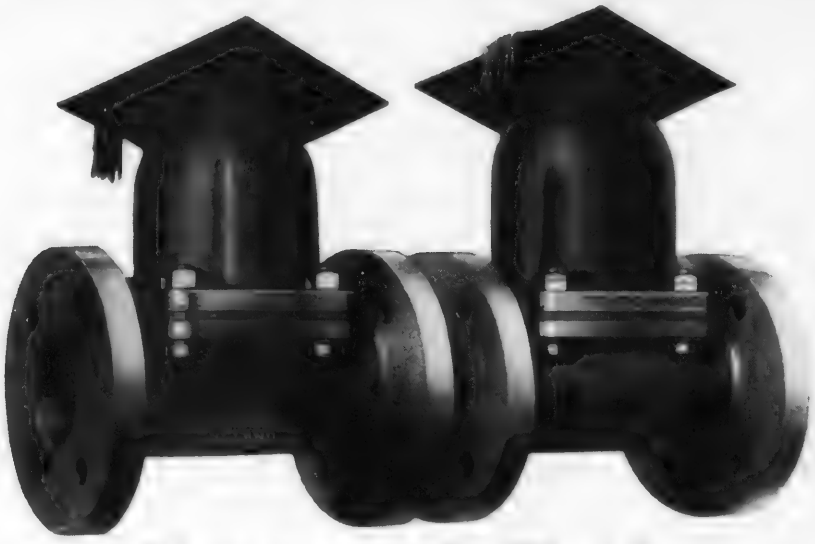

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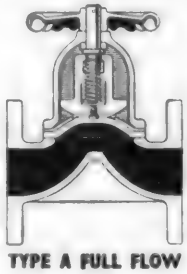

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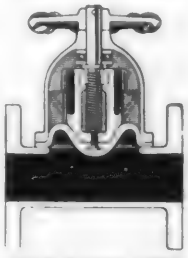

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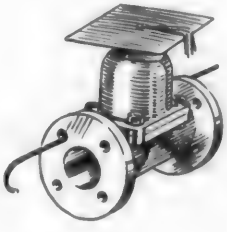

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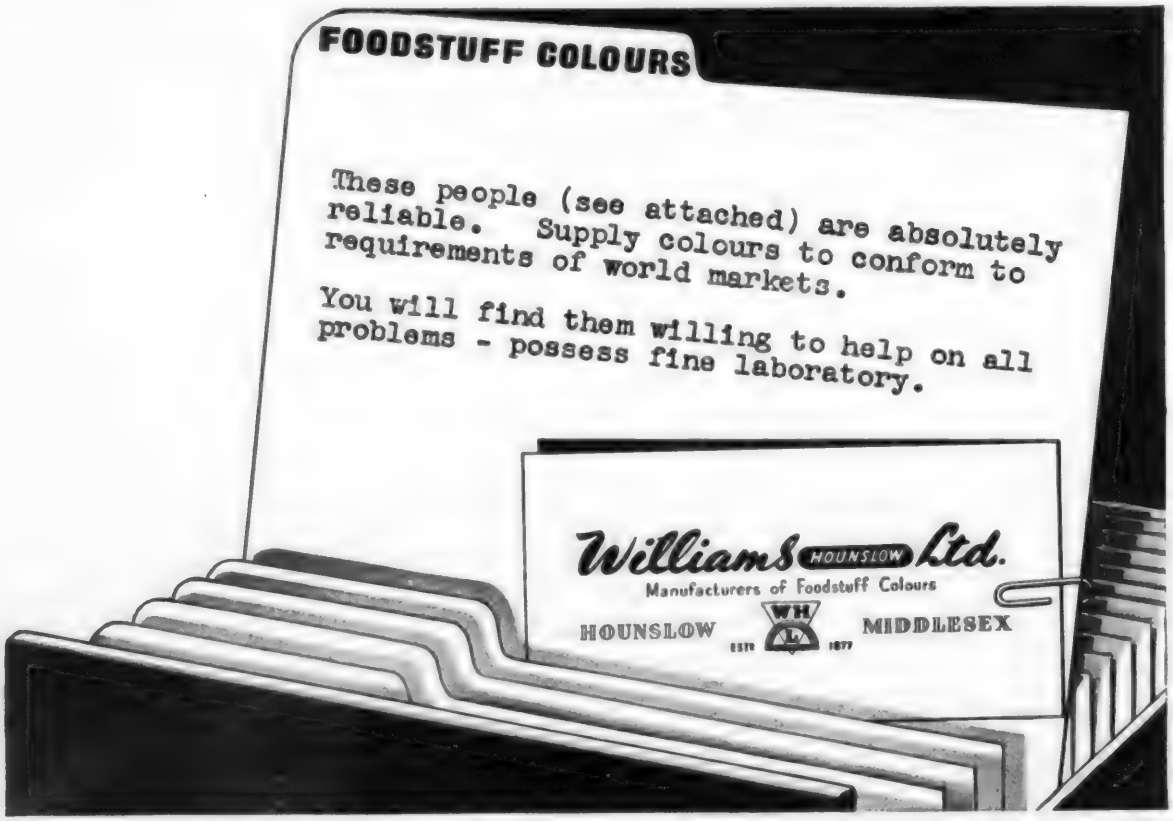
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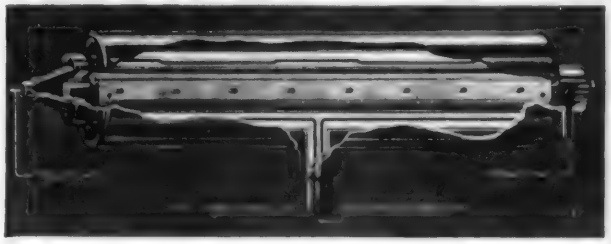

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FOOD MANUFACTURE

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A Publication of the Leonard Hill Technical Group—ENGLAND: Stratford House, 9 Eden Street, London, N.W.1. (Euston 5911). UNITED STATES: 3 Villa Drive N.E., Atlanta, Georgia; Statler Office Building, Boston 16, Massachusetts. BELGIUM: 171, Avenue des Croix du Feu, Brussels, 11. ITALY: Piazza Degli Affari 4, Milan; Via Filippo Turati 3, (Palazzo Giardino), Milan. SWITZERLAND: Forchstr. 99, Zurich 7/32. HOLLAND: Central Bureau Voor Verkoopontwikkeling, Amsterdam. GERMANY: Auf der Reide 20a, Dusseldorf-Unterrath.

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FOOD MANUFACTURE

Vol. XXXII No. 3 March 1, 1957

A challenge to the industry

Food technology and greater buying power have combined to change food preferences since the war. Margarine, canned meats and canned fruit and fruit juices have become much more popular at the expense of condensed milk, butter, canned fish and fresh citrus fruits.

In 1936-37 the average family in Britain spent 8s. 10½d. a week on food. In 1954-55 the figure was 24s. 5½d. Even allowing for the decline in money values, this still represents more of the consumer's £ spent on food. In 1938 the proportion was 29·2%. In 1955 it was 32·4%. These figures seem to contradict Engel's law which states that the percentage of income devoted to food declines as the family's income goes up, thus providing a guide to relative standards of living. However, Engel may not be entirely contradicted. In the first place the late 1930s were not "normal" because imported food was cheap, cheaper than in the 1920s and early '30s when the proportion of income spent on food was generally over 30%. Secondly, consumers now spend more on quality rather than quantity. This may be manifested in pre-packaging and processing as well as in intrinsic quality. However, the proportion of income spent on food cannot but be distorted when such an important outlay as rent is kept artificially low by controls. With the prospect of higher rents arising from the proposed new housing legislation, the proportion of income spent on food may well decline.

It would be entirely wrong, therefore, for the food industry to assume a steady rise in food expenditure. Competition, already keen, is bound to get keener as purses get shorter. "The challenge to the food industries," to quote *The Times*, "if they wish to maintain their share of the consumer's £, and even increase it, is to combat the natural conservatism of the English diet along its lines of least resistance." This should be done by encouraging the consumption of more of the animal protein and protective foods and by creating a wider demand for the newer processed foods which have such a high convenience value.

Longer life for mayonnaise

Glucose oxidase and catalase enzymes are claimed to be the answer to the problem of preventing rancidity in mayonnaise. It is claimed that the shelf life of experimental batches of mayonnaise containing these enzymes has been extended to as much as six months.

Mayonnaise, of course, is particularly susceptible to oxidative rancidity. As an oil-in-water emulsion, the surface area of the oil is very great. In addition, the whipping process incorporates approximately 10-12% air into the finished product. Then it is packed in glass containers and exposed to light and stored at ambient temperature which may be over 100°F. at times.

Relatively stable products have been produced through the use of rigid specifications to prevent the use of oil which has taken up oxygen, the substitution of stainless steel for copper alloy plant and, to a certain extent, by the replacement of air during beating with nitrogen. However, the finished product still only lasts about three to four months. The makers of *Fermcozyme*, a glucose oxidase-catalase preparation effective at the low *p*H of mayonnaise, claim that this product will greatly extend the shelf life of mayonnaise by the removal of oxygen. The glucose introduced as egg yolk and that resulting from the spontaneous acid inversion of the sucrose normally present in mayonnaise serves as the substrate for the *Fermcozyme*. Under its influence, the glucose is oxidised to glutonic acid, as a result of which oxygen is removed. Two commercial-sized batches (60 gal.) of an 80% oil mayonnaise were made, one containing 50 p.p.m. of *Fermcozyme*. Both were examined visually, organoleptically and chemically, for peroxide value, after six months. The development of oxidative rancidity in the treated batch was prevented for the whole period, though the controls were perceptibly rancid and faded as early as the third month. The peroxide value of the enzyme-treated mayonnaise had risen only 0·6 mm./kg. as opposed to an increase 24 times as great in the control.

Fermcozyme is now available in this country from Hughes and Hughes, Ltd.

Food for spacemen

UNLIKE the supermen of science fiction, ordinary human space travellers will be preoccupied to a large extent by such mundane matters as food. In anticipation of their unusual requirements, a new concentrated food has been developed by the National Research and Development Corporation in America. It has the rather uninspiring name of the Multi-Meal-Tube. It is a metal tube, with a plastic cap which can be removed with one hand so that the contents can be squeezed directly into the mouth leaving the other hand free for the controls of the space ship. The food is described as a homogeneous mixture of cellulose gum, which provides the necessary bulk, and carbohydrates, fats, proteins, minerals, and vitamins, all in the correct proportion to meet basic requirements. The mixture also contains preservatives and flavouring to make it "palatable."

The Multi-Meal Tube is designed to prolong absorption so that appetite is satisfied for a longer time than is achieved by ordinary food.

One tube, containing a complete meal of 720 calories, weighs about 5·3 oz. and measures 1¼ by 4 in. The meal contains about 50 g. each of carbohydrate and fat, and about 10 g. protein. Taken three times a day, this would give a total of 1 lb. of food per day, which is about half the minimum requirement of unconcentrated food. The space saved by using the new food could be used for extra fuel or passengers. Nutritionally the composition seems ideal, but monotonous.

Protection underfoot

NO PART of the average food factory stands such hard treatment as its floor. Bearing a heavy load of machinery, often subjected to continual vibration and the pounding of trucks, the troubles are increased by the chemical reactions of some raw materials and occasionally by corrosive action. The problem of providing chemical- and corrosion-resistant floors is considered by Bernard Mohr in a recent issue of our associate journal *Floors*.

Fortunately, chemical conditions in food factories are relatively mild. A brick floor finishing is recommended and three types of material should be considered simultaneously—membrane, acid- and chemical-resistant brick and acid- and alkali-resistant mortars. Rubber/bitumen emulsion has been used as a membrane in many food factories. It is particularly suitable for application to concrete bases. Chemical-resistant bricks are used to resist thermal strains and stresses. Several grades and types of cements and mortars can be used as corrosive-resistant jointing and bedding materials for brick and tile.

Confide in your packaging expert

FUTURE trends in packaging were discussed by package makers, food manufacturers and distributors at the 1957 Packaging Convention held recently in conjunction with the Packaging Exhibition. The customers themselves had to be spoken for. Mr. Magnus-Hannaford, of the L.C.C. College for the Distributive Trades, described how he had constructed a questionnaire designed to throw light on consumer preferences. "Alas for scientific method," he mourned, "we found no trend . . . no pattern . . . neither order nor regularity . . ."

What did emerge was that nearly every housewife expected and looked for integrity from the packager. Misleading packs and inferior merchandise in attractive new forms will not sustain the housewive's confidence.

Both Mr. Magnus-Hannaford and Mr. F. Brian Smith, who represented the retailer, called for reasonably sized packs, and for a greater use of new packaging materials and techniques—particularly as far as collapsible tubes and the various types of films are concerned.

A food manufacturer, Mr. C. F. Lenton of Reckitt and Colman, Ltd., was only too concerned to lift the industry "out of the rut of accepted packaging methods." He welcomed such moves as tea bags, polythene lemons and soups in sachets, and suggested that future progress should be patterned by the imaginative use of new materials, such as plastics, cellulose film, laminates, etc.

Steps towards the achievement of better packaging should include the formation of a central design depot, a central layout organisation supplying packagers with ideal layout instead of selling them machines, and a central unit supply service where a packager could be advised on the best types of machines to link together instead of buying weighing machines, closing machines, conveying equipment, and metal detection equipment, check-weighing all from different sources. Above all, there should be less secrecy between food manufacturers.

It was left to the last speaker, Mr. R. S. Johnson of the Metal Box Co., to speak for the package manufacturer. His main theme was that the best package is achieved by collaboration between the food manufacturer and the package manufacturer, and he did not envisage any revolutionary developments in raw materials. "I do not foresee spherical plastic containers for processed foods, nor eggs in aerosol dispensers," he said. Package users rightly expect service from package makers, but some of them do not avail themselves of it as much as they could or should. A packaging service cannot be really effective unless the client is prepared to confide in the specialist, fearlessly and frankly. Mr. Johnson con-

firmed that the packaging industry is fully capable of satisfying future requirements, but that it cannot accomplish the task alone. He concluded: "We shall only see better packaging as a result of a warm spirit of co-operation all along the line, the line of raw material suppliers, package makers, food manufacturers and the ultimate distributors."

Colour and appetite

A SMART women's magazine recently suggested to its readers that they should hold parties in which all the food and drink was of one colour only. Shortly afterwards a sober Sunday newspaper printed directions for preparing green butter, black eggs and other curiosities. These eccentricities merely emphasise the well-known fact that we are all conditioned in our acceptance of food by its conventional colours. This is shown most forcibly by the need to artificially colour processed foods.

Striking examples of the strange things that can happen when the eye and the palate are against each other were given by Mr. G. J. Chamberlain, managing director of The Tintometer, Ltd., when he spoke to the Society of Dyers and Colourists. He called his talk "Kippers, Cocktails, Confectionery and Colour." Mr. Chamberlain recounted how a banana-flavoured jelly was positively identified as raspberry because it was coloured red, and nailed his point home by exhibiting samples of blue cake, green sausage and violet fish paste. They looked quite unappetising.

The case for accurate colour measurement is stronger now than ever before, not only because of the complex situation created by the use of artificial colouring, but because of the display lighting used in many restaurants, cafés and other places where food is sold. "We have not yet bred a race which can accept fluorescent light and believe that it does not alter colour of objects," said Mr. Chamberlain.

Colour measurement in the control of food processing is, of course, used by the housewife and manufacturer alike. The housewife looks at the colour of her cakes and biscuits not only to ensure that they are properly cooked, but to get uniformity of appearance. This is even more important to the plant baker who sets an exact standard for the colour of his product. Colorimeters are available with devices for spinning the biscuits rapidly during observation to overcome the non-uniformity of surface.

Very close specifications are laid down for permitted additives and contamination in foodstuffs, and the chemist uses colorimetric methods for assessing micro amounts. Colorimetric methods of analysis are so sensitive, said Mr. Chamberlain, that one can, for example, assess chlorine quantitatively down to 1 part in 100 million.

Still more meat

WORLD production of meat continues to rise. The Commonwealth Economic Committee's annual review* reports that between 1938 and 1955, the world output of meat rose by 40% and a further increase was recorded in 1956, though world trade during this period increased by only 5%. However, the rise in consumption that these figures imply was not fully matched in *per caput* terms because of the large expansion in human population. Only in the U.S.A., Canada, New Zealand and Australia is consumption per head of carcase meat higher than before the war. In Britain it has risen sharply since 1951, but in 1955 there was still a shortfall of 5 lb. compared with pre-war. Later reports show that this was made good in 1956.

Beef and veal production has risen the most. World output rose by 3% in 1955, when it was over 50% above the pre-war figure of almost 10·5 million tons. Beef exports generally are estimated to have been over 610,000 tons, which brought them to within 2% of the post-war peak reached in 1949, though they were still 20% less than before the war. A considerable part of the rise over 1954 was in Commonwealth supplies, while exports from Argentina have almost doubled.

In the U.K., the increase over 1954 was wholly in imports: production declined by nearly 60,000 tons. Consumption per head, at 46 lb., was 9 lb. below the pre-war average.

World production of mutton and lamb increased slightly during 1955, but, in spite of the rise in New Zealand output, Commonwealth production declined. International trade in mutton and lamb fell in 1955, although it remained much higher than before the war; the Commonwealth's share of world exports fell from 87% in 1951 to 80% in 1955, as Argentine shipments continued rising.

An increase in world pig-meat output in 1955 was continued in the following year owing to greater production in North America. The slight rise in pig-meat exports in 1955 was mainly attributable to a recovery in bacon exports from Denmark and the Netherlands.

Nevertheless, world exports of bacon and ham in 1955 remained below those of 1938, while pork exports were much higher. These changes have been reflected in supplies in the U.K., where production of both types of pig-meat in 1955 were well above pre-war levels; consumption per head of bacon and ham in 1955 is put at 25 lb., and that of pork at 18 lb., some 3 lb. lower and 8 lb. higher respectively than before the war.

* *Meat*. Commonwealth Economic Committee, 1956. H.M.S.O. 5s. net.

Tea and serendipity

NATIONALISATION is becoming an obsession with Middle and Far Eastern countries which have recently gained their independence. While the world is still suffering from the effects of President Nasser's actions, the London tea trade has heard with surprise and concern of the Ceylon Minister of Food's scheme to nationalise the tea industry.

Fortunately, at the time of writing, it seems that there is as much opposition to the scheme in Ceylon as in London. Even Prime Minister Bandaranaike's cabinet is divided on the issue. Knowledgeable people in Colombo seem confident that he will not precipitate a political crisis on the nationalisation of tea.

Horace Walpole coined the word "Serendipity" to describe Ceylon's faculty for finding good fortune by accident. It would be a tragedy if her present leaders put their nation's economy in hazard by short-sighted planning. Britain is the mainstay of the market for Ceylon tea, and tea is over half Ceylon's exports.

Whither whaling?

"THE future of the whaling industry is obscure," said the chairman of Hector Whaling, Ltd., reporting on what he admitted were "disappointing accounts." He told of the rapidly expanding Japanese whaling fleet and of the prospect of intense competition in Antarctic whaling, and disclosed that in future the company will develop tanker building rather than whaling operations.

The current whaling season started in January, and although its future may be obscure, it is certain that one of its outstanding features is the growth of the Japanese fleet. It is reported that this will have expanded from two expeditions three years ago to six or more in 1957. Out of a total of 21 expeditions in the 1957-58 season, Japan will be operating eight.

The Norwegian whaling fleet is the largest in the world, with the British second and the Japanese a very close third. The increase in the Japanese fleet is largely because of purchases from other whaling nations. The Onassis whaling fleet was sold to a Japanese company last year; the Union Whaling Co. of South Africa is selling its factory ship *Abraham Larsen* to Taiyo Gyogyo Kabushiki Kaisha (though the transfer will not take place until May so that current Antarctic operations will be unaffected), and more recently one of Chr. Salvesen's fleets—this is the second of the two major British whaling companies—was offered for sale to the Japanese. In Norway, the chairman of the whaling association said that the country's nine Antarctic whaling expeditions can be expected to earn just about enough to cover expenses and the future is even darker.

There are several reasons for the growth of the Japanese whaling industry. One is that the Japanese themselves seem to be the only whale-catching nation that is genuinely fond of whalemeat. However, the main reason is that operating costs are far lower for them than for other countries. The cost of a Japanese expedition is believed to be about half of that for a British expedition, while the wages are about two-thirds of those paid to British crews.

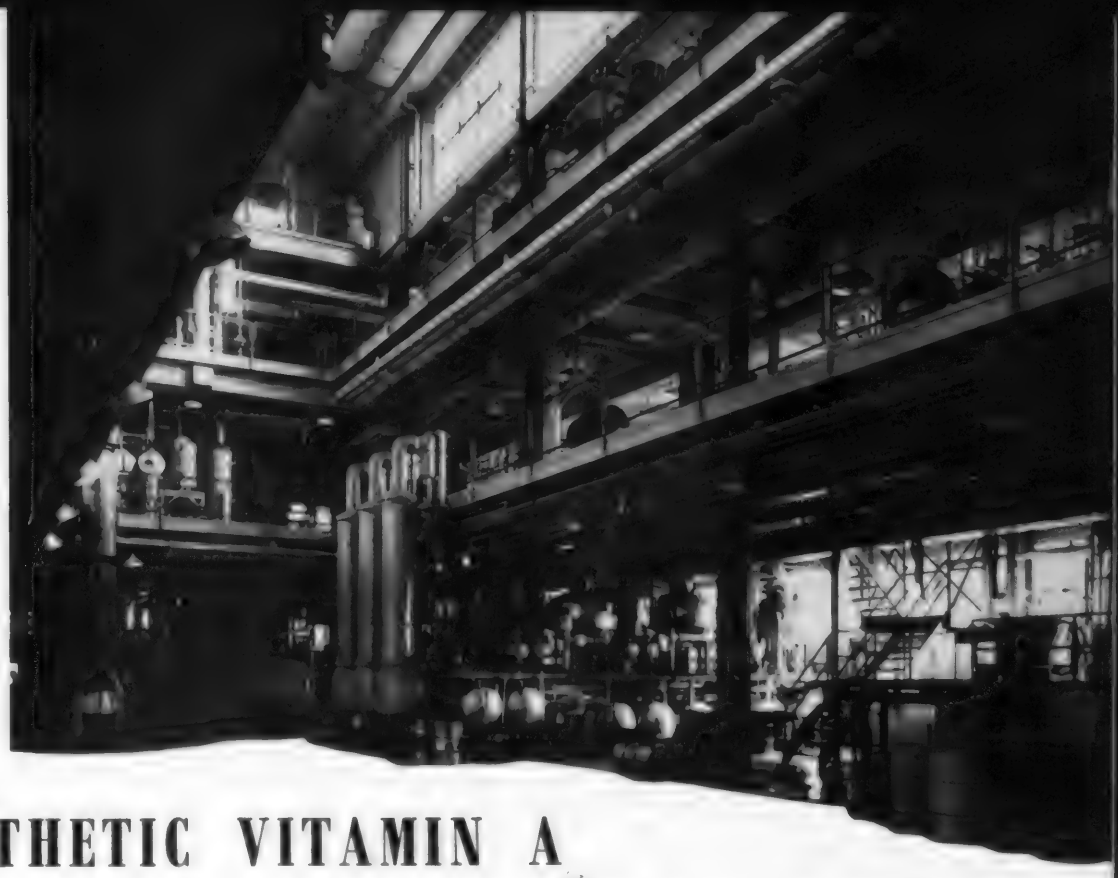
Stranger than fiction

THAT VARIETY is the spice of life seems to be the motif behind developments relating to food and drink which are ever hitting the headlines. In this age of measuring instruments, for example, it is not surprising to read of American gadgets like the "drunkometer" for testing tipsy motorists and the "gynathodynamometer" for measuring one's bite.

One can only guess at the working of the drunkometers issued to New York police to detect a too-liberal imbibing of C_2H_5OH. The instrument must obviously be dependent on something better than a rapid iodoform test, or even perhaps a catalytic surface-combustion analysis of the victim's breath. It may be that a carbon isotope has been secretly included in all products of American breweries and distilleries; hence the clicking or clucking of the Geiger counter—more to the point than making the motorist walk the white line.

The gynathodynamometer, developed by the New York Academy of Dentistry, seems a strange name for measuring the power of one's jaw, especially since the interested party asking for such an instrument is likely to twist his jaw in the effort. Civilised man is developing a weak jaw because of his sloppy diet, we are told. So instead of measuring one's muscles with normal gadgets of fairgrounds or amusement arcades, here is a new idea; a jaw-breaking contest which should appeal to men with a gnawing ambition to be teeth-gnashing dictators.

Then on to yet another innovation, this time a "palatable poster" which has been banned by the New York Transport Authority from display in their subway trains. The poster was a three-dimensional one, complete with odour guaranteed to rouse the gastric juices. It depicted a mammoth plate of spaghetti and sauce and evolved an odour "enough to drive a spaghetti-hungry man wild," incorporating tomato and garlic and claimed to be potent at 20 yards for a period of 45 days. Alas for the ban; for American catering advertising will now have to fall back on their sandwiches and delicatessen "with an eye appeal," those "varied, colourful and glamourous" snacks like chicken sandwiches shaped like little aeroplanes, or hot dogs grouped round a tomato and garnished with olives.



SYNTHETIC VITAMIN A

New Roche plant at Dalry, Scotland, is the first in the British Commonwealth

By R. G. Sims*

The first large-scale production of synthetic vitamin A has just commenced at a new factory at Dalry, Ayrshire. Annual capacity is at least 40 million million international units of this essential vitamin which is being increasingly used to fortify margarine and other foods. All commercial forms of the vitamin will be prepared from crystalline vitamin A acetate or palmitate. Here is an exclusive description of the factory and its operations written specially for "Food Manufacture."

EXTENSIVE and ever-increasing work during the last forty years has led to the isolation, determination of the chemical constitution, and finally the synthesis of the most important vitamins on a commercial scale. Roche Products, Ltd., and their associates, in particular in Switzerland and the U.S.A., have been pioneers in the large-scale synthesis of vitamins, and plants for the manufacture of vitamins B_1, B_2, C and E—not to mention some of the lesser vitamins—have been erected in this country during the last eighteen years.

The latest synthesis of a major vitamin is that of vitamin A, which the Roche organisation achieved ten years ago.

Role of vitamin A

In the animal organism, vitamin A is considered to act chiefly as a regulator of the growth and activity of certain epithelial and glandular tissues. Also it plays an essential role in the visual cycle through its participation in the synthesis of visual purple by the retina.

Human beings obtain part of their requirements as the vitamin itself from animal sources, and part from carotenes contained in vegetable foods which are converted into vitamin A in the intestine. The liver is capable of retaining reserves of vitamin A which the body uses to supply the physiological demand when the dietary intake is low.

Above. **Part of the main plant at Dalry. In spite of the highly complex process of commercial vitamin A synthesis, the plant layout is extremely compact.**

* Roche Products, Ltd.

The final stages of completion at Dalry.

Discovery and synthesis

From the summarised review on this page of the discovery and synthesis of vitamin A it will be seen that the structure of vitamin A was elucidated as long ago as 1931 as a result of investigations carried out chiefly by Prof. Karrer of Zurich, and Prof. Heilbron and his associates in England. It was not until 1947, however, that a really practical synthesis of this relatively unstable and complicated molecule was achieved by Dr. O. Isler and his research team in the Roche laboratories in Basle. Then followed the difficult task of transforming the laboratory synthesis into a plant scale process. Early in 1950 the major development problems had been overcome and the first large-scale plant was producing to full capacity. Since then two manufacturing units within the Roche organisation—one in Switzerland and the other in America—have helped to meet the growing world demand for synthetic vitamin A concentrates. Now a new Roche plant at Dalry in Ayrshire is coming into production—the first in the British Commonwealth.

The large-scale synthesis of vitamin A is generally recognised as an outstanding achievement having regard to the chemical engineering problems involved. Some of the steps involve reactions presenting entirely new hazards and others reactions of great delicacy requiring extremely rigid control.

In its highly purified form, vitamin A is readily susceptible to oxidation. Dr. Isler and his colleagues solved the problems of synthesis by avoiding the preparation of highly unstable multi-conjugated intermediates in all but the final steps. Previously many attempts to synthesise vitamin A had been based on building up the carbon skeleton of twenty carbon atoms step by step. These steps all had the disadvantage that the sensitive structural elements of vitamin A were introduced in the early stages of the synthesis, thus rendering the intermediates highly unstable and exposing them to the destructive influence of subsequent chemical operations.

The Roche synthesis

The principal raw material is citral in the form of lemongrass oil. Essentially the synthesis consists of adding four carbons in twelve steps to the citral—which is a C_{10} compound—to form a C_{14} intermediate. Meanwhile a C_6 side chain is being built up and

THE DISCOVERY AND SYNTHESIS OF VITAMIN A

1913

Discovery: McCollum and Davis in Wisconsin; Osborne and Mendel in New Haven, U.S.A.

1920 to 1930

Development of assay methods and extraction from fish liver oil: Drummond and co-workers in England; Heilbron and co-workers in England.

1931

Structural formula announced: Karrer, Morf and Schöpp in Zurich, Switzerland.

1930 to 1940

Technical progress in preparing vitamin A concentrates from fish liver oils and other natural sources. Development of molecular distillation of vitamin A concentrates by Hickman and co-workers in Rochester, U.S.A.

Numerous attempts at synthesis: Kunn and Morris in Heidelberg, Germany (1937).

1942

Preparation of vitamin A crystals from natural sources: Baxter and Robeson in Rochester, U.S.A.

1946

Synthesis of vitamin A methylether: Isler, Huber, Ronco and Kofler of Hoffmann-La Roche in Basle, Switzerland; Milas, Massachusetts Institute of Technology, Boston, U.S.A.

Synthesis of vitamin A acid: Inhoffen, Arens and Van Dorp in Oss, Holland; Karrer, Jucker and Schick in Zurich, Switzerland.

1947

Synthesis of crystallised vitamin A on laboratory scale: Isler, Huber, Ronco and Kofler of Hoffmann-La Roche, Basle, Switzerland; Cawley, Robeson, Weissler, Shantz, Embree and Baxter in Rochester, U.S.A.; Arens and Van Dorp in Holland.

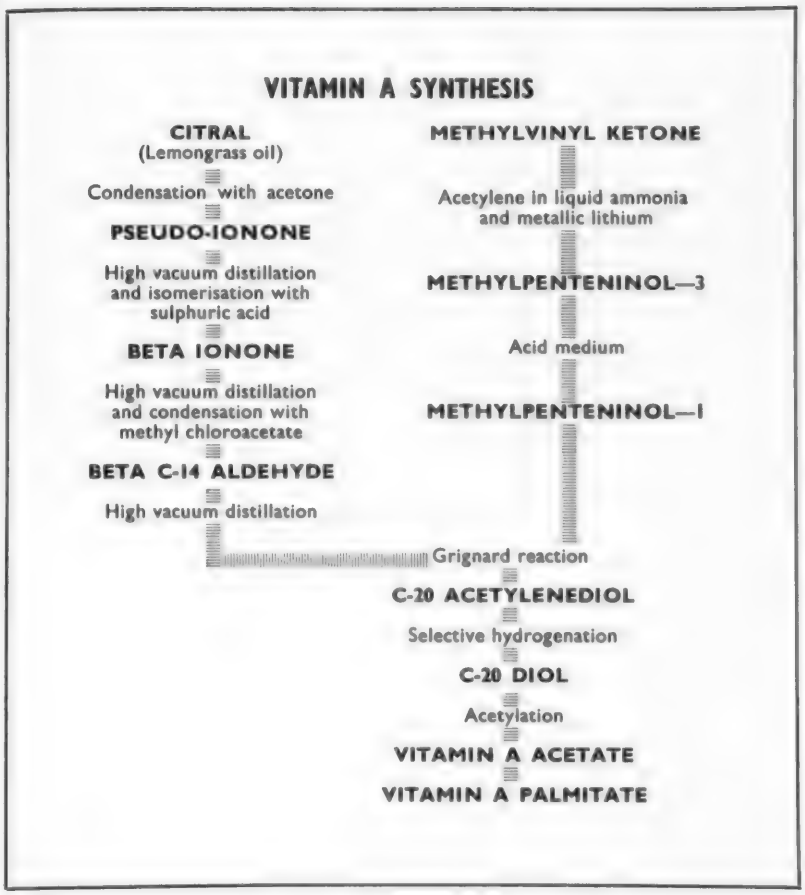
1950

Large scale production in the Roche plants in Basle, Switzerland, and Nutley, U.S.A.

Today

Vitamin A produced by the Roche synthesis is available in many forms specially developed for use in foods, pharmaceuticals and animal feeds.

Vitamin A made under the Roche process, now highly developed from an engineering viewpoint, provides a high percentage of the world's total vitamin A requirements at a low cost.



this is hooked to the C_{14} intermediate, thus completing the C_{20} structure of the vitamin A molecule. It takes eight of the twelve steps in the synthesis to build up this C_{20} structure.

The following is a brief description of the process:

Adding Four Carbons. Citral is condensed with acetone to yield pseudo-ionone. The latter is purified by high vacuum distillation and isomerised with sulphuric acid to *beta*-ionone. This is then distilled under high vacuum and condensed with methyl chloroacetate to yield *beta* C_{14} aldehyde which is again purified by high vacuum distillation.

Building up the Side Chain. The C_6 side chain is prepared by reacting methylvinylketone with acetylene in liquid ammonia with the aid of metallic lithium (ethinylation). The resulting tertiary alcohol (methylpenteninol-3) is rearranged in acid medium to yield the primary acetylenic alcohol, methylpenteninol-1. Both alcohols must be carefully rectified in high vacuum.

Large scale Grignard reaction which requires automatic process control.

Combining C_6 Side Chain and C_{14} Aldehyde. *Beta* C_{14} aldehyde and methylpenteninol-1 are combined in a Grignard reaction to C_{20} acetylenediol which, although it already contains the basic structure of vitamin A, has to undergo several reactions to produce the characteristic system of double bonds present in the vitamin A structure.

Final Steps. The triple bond is reduced to a double bond by selective hydrogenation—that is to say, C_{20} acetylenediol becomes C_{20} diol which then undergoes allyl rearrangement and dehydration to produce vitamin A. In order to protect the primary alcohol group present in the C_{20} diol during the process of rearrangement, the latter has to be acetylated so that vitamin A appears in the form of acetate. C_{20} acetylenediol and C_{20} diol are isolated as crystalline materials. Their purification by crystallisation is important for the production of vitamin A in the purest form.

The diagram on p. 99 shows the manufacturing sequence and the products isolated.

Factory site

The site for the new British factory was chosen after many possible factory sites in England, Scotland and Wales had been investigated. The considerations which led to this choice were principally the good potential water supply and means for the disposal of effluents, and the availability of labour of the necessary high standard. The site covers an area of 15 acres and the building operations were started late in 1954.

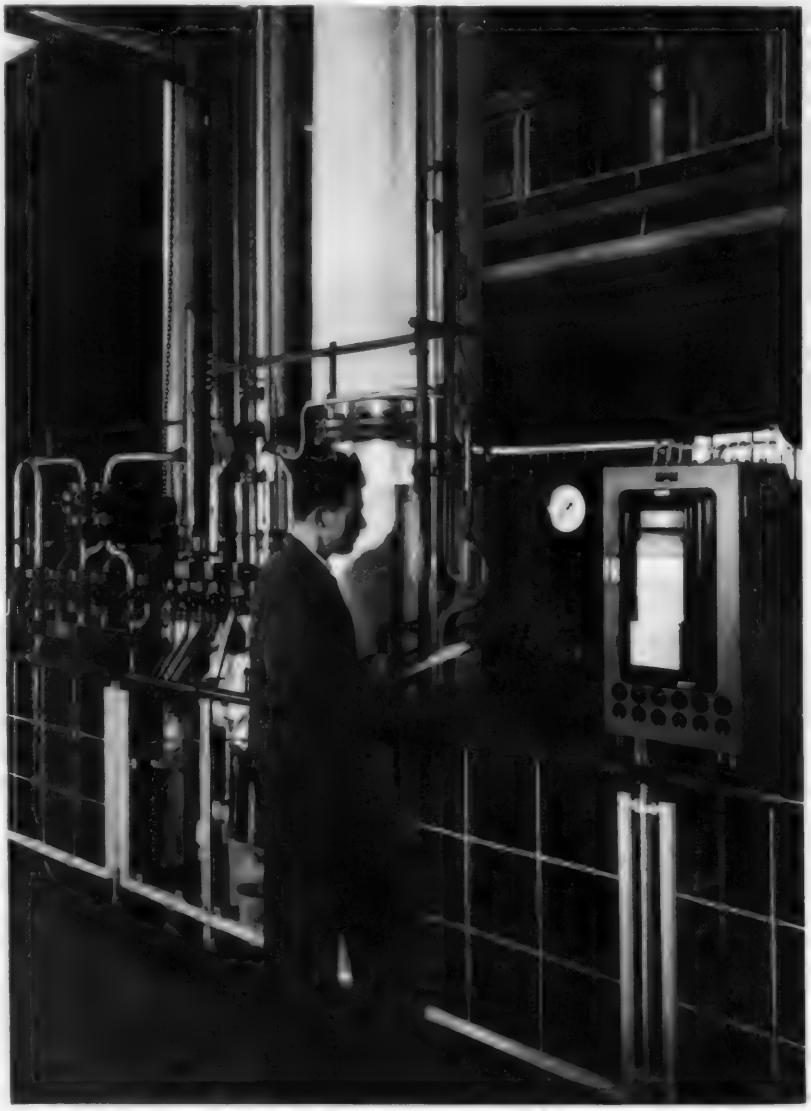
The buildings consist of the main manufacturing unit, effluent neutralising plant, underground tank farm, raw material stores, separate boiler house and office and canteen. They are of a type developed by the Roche organisation for the particular manufacturing operations in which it specialises and will have a familiar look to those acquainted with their main factory at Welwyn Garden City or the plants of the many associated Roche companies throughout the world. In this new factory, manufacture of the first batches of synthetic vitamin A acetate commenced in December and production will be stepped up gradually so that by the middle of this year the plant will be working to full capacity producing the high potency acetate and palmitate concentrates which are already being widely used here by many food, pharmaceutical, and livestock feed manufacturers.

Under normal working conditions the output of synthetic vitamin A concentrates will amount to at least 40 *million million international units during a full year's production—equivalent to* 40,000 *kg. of a* 1 *million i.u. per g. concentrate.*

Advantages of synthetic vitamin A

The outstanding advantages of synthetic vitamin A are its purity, uniformity and reliability. It is available in a wide variety of special forms for all manufacturing purposes. For instance, high potency crystalline vitamin A acetate and palmitate, as well as a comprehensive range of oily dilutions and free-flowing dry powders, are now being prepared.

All commercial forms of Roche synthetic vitamin A for food and pharmaceutical manufactur-



Detail of high vacuum distillation equipment requiring constant attention.

Solvent recovery units.

ing purposes are made from highly purified and crystalline vitamin A acetate or palmitate. Accordingly they are virtually free from biologically inactive by-products.

In so far as pharmaceutical preparations are concerned, the availability—at economically attractive prices—of high potency concentrates of both synthetic vitamin A acetate and palmitate has greatly simplified the manufacture of more stable, convenient and pharmaceutically elegant preparations. For example, they facilitate the development of aqueous dispersions containing both fat-soluble and water-soluble vitamins—products which are attractive and, generally speaking, preferable for the oral administration of vitamins to infants and young children.

Food fortification

Also synthetic vitamin A concentrates are becoming increasingly important for the fortification of foods, beverages and dietary supplements. Their high degree of stability, uniformity and freedom from any fishy odour or taste are characteristics which make them admirably suitable for the vitamin A fortification or standardisation of such products. In particular, synthetic vitamin A is being exclusively used for margarine fortification here with excellent results in so far as stability and consumer acceptability are concerned.

Animal nutrition

In recent years a great deal of attention has been paid to the role of vitamin A in the field of animal nutrition as well as to ensuring that livestock obtain adequate amounts of this essential nutrient. It is, of course, well known that considerable losses in vitamin A activity occur purely as a result of oxidation in such feeds as stored hay, grains and silage which are generally considered important sources, or precursors, of vitamin A. This, coupled with the intensive conditions under which livestock are kept today, has led to a growing appreciation of the value of feed supplementation with vitamin A in a stable and reliable form.

With the introduction of high potency vitamin A concentrates, the problem of producing preparations to facilitate the vitamin A standardisation of animal feeds has led to the marketing of free-flowing premix powders. The Roche powders consist of finely dispersed synthetic vitamin A in a gelatin/sugar/starch beadlet which protects the vitamin A from oxidation, the adverse effect of moisture and minerals, whilst at the same time maintaining full biological activity and availability to the animal.

SOME SUPPLIERS OF EQUIPMENT

Refrigeration plant: *L. Sterne and Co., Ltd.*

Stainless steel vessels: *Thompson Bros. (Bilston), Ltd.; T. Giusti and Son, Ltd.; Stainless Steel Vessels, Ltd.*

Mild and stainless steel tanks: *Maitlands (Metal Works), Ltd.*

Glass-lined steel vessels: *Enamelled Metal Products, Ltd.*

Copper plant and vessels: *John Dore and Co., Ltd.*

Liquid ring pumps: *Sulzer Bros. (London), Ltd.*

Instrumentation and control equipment: *Negretti and Zambra, Ltd.*

Valves and fittings: *Crane, Ltd.*

Special low temperature refrigeration plant: *J. and E. Hall, Ltd.*

The ABC of Food Manufacture

New Edition of FOOD INDUSTRIES MANUAL Now Available

The new edition of The Manual, published by Leonard Hill, contains more information on food technology than any previous edition. The Manual is really 15 books in one, plus a comprehensive Buyer's Guide. It contains 1,026 pages and measures 5½ in.×8¾ in. It costs 65s. net, and orders can be placed with Leonard Hill (Books) Ltd., Stratford House, Eden Street, London, N.W.1, for immediate dispatch.

Reviewed by D. Pearson, B.Sc., F.R.I.C.
(National College of Food Technology)

SIX years have elapsed since the publication of the previous edition of the Food Industries Manual and the 18th edition reflects many of the changes which have been taking place since that date. Once again, in view of the complexity of the subject, the publishers have called upon the services of a series of experts, all well known in their particular field. In all they have contributed fifteen main sections.

The items in each individual section are, as in previous editions, arranged alphabetically, and there is in addition a comprehensive index at the end of the book. A number of the sections have been revised or re-written in order to bring the manual in line with changing conditions, and the glossy paper used, together with more readable type, makes it more attractive in both appearance and handling.

The first two sections have been re-written by one of Britain's leading cereal consultants, A. J. Amos, PH.D., B.SC., F.R.I.C. They are entitled **Flour and Flour Milling** and **Breadmaking and Confectionery,** both of which were previously combined in a single chapter. This has enabled Dr. Amos to extend the subject considerably and both chapters represent a mine of information with no subject or term of importance omitted.

A section entitled **Sugar Confectionery, Chocolate, Jams, Jellies** follows and this has been compiled by J. Valentine Backes, A.R.C.SC., D.I.C., A.R.I.C., C. T. Williams, and others. These

authors have included many subjects which are not easily found by looking through even some of the more specialised works on the subject. Two examples of this are lemon curd and liquorice, about which there appears to be little published information from the practical angle and approximately two pages are devoted to each subject.

No less than five experts including Dr. C. L. Cutting of the Torry Research Station (D.S.I.R.) at Aberdeen have made contributions to the fourth section entitled **Canning and Preserving,** and this has undergone some revision. Here again there is much useful information which is seldom found in any other volumes, and it is pleasing to note that the publishers have decided to retain those somewhat factual but most useful tables which relate sugar strengths with the more important commercial hydrometers. It is surprising how often these are useful in practice in numerous types of food manufacture.

Sections five and six, **Meat Products,** by the late T. Crosbie-Walsh, F.R.I.C., and **Pickles and Sauces,** by E. F. Eaton, F.R.I.C., both give a number of items in considerable detail. The latter chapter covers a difficult subject in an authoritative manner and reflects the author's contact with the problems which may arise in this particular industry. It includes a useful section on laboratory control and there are a large number of recipes for many types of pickles and sauces.

The Dairy Industry, section seven, is in the capable hands of J. G. Davis, D.SC., PH.D., F.R.I.C., who is well known for his informative writings relating to this well-organised industry.

Food Dehydration is the title of the eighth section, which covers the main processes and plant used in this modern field and reflects many of the changes which have taken place during a short span of time.

The next section relates to **Edible Fats and Fatty Foods.** This has been thoroughly revised by M. K. Schwitzer, M.I.CHEM.E., and gives a first rate coverage of the subject. This includes descriptions of individual oils, manufacturing processes, analytical values and spoilage.

There follows **Fruit Juice Pro-**

ducts and **Food Storage and Refrigeration,** both of which cover ground which is highly practical, but at the same time is not lacking in the scientific information on which all technology is based.

Two sections follow, **Food Handling Equipment,** which covers the methods of conveying materials in the factory, and **Packaging,** which gives descriptions of all the important materials used, together with information relating to such topics as heat sealers and adhesives.

It has frequently been stated that **The Boiler House** (the title of section 14) is one of the most important parts of the factory, as without it many manufacturing processes would be impossible. It is inevitable, therefore, that this comprehensive work should include this as one of its sections. This was compiled by the late H. C. Appleby, M.INST.F., A.M.I.MECH.E., who before his death was closely concerned with that all-important boiler-house problem, fuel economy.

However well the practical side of food technology is known, nobody in the industry can feel at home with the subject unless he has a reasonable knowledge of the **Composition of Foods,** which is the title of the last section (the 15th). It is pleasing to notice that these composition tables have been thoroughly revised and now represent a comprehensive series of figures on foods ranging from raw foods such as cereals, dairy products, flesh foods, fruit and vegetables to many manufactured products such as glacé cherries, chocolate, chutney, jam, golden syrup, coffee infusions and meat extract, to mention just a few. Finally, there is a comprehensive index followed by a most useful **Buyers' Guide,** of suppliers of plant and equipment, raw materials and packaging materials. This last section has been completely revised and extended.

The Manual is certainly unique in its coverage of almost all manufactured foods in one volume, and all the authors have made their contributions in language which should easily be understood by all readers. There are, throughout the book, descriptions of procedures and plant, together with numerous basic recipes, which are sure to prove useful to all who have to try out "new lines." Among the information given which is not to be found in any other volume is material relating to analytical tests used in the food industry, and these items are much more valuable than many chemists realise.

As with past editions, this 18th edition of the Manual is bound to be considered a "must" by all chemists, technologists, manufacturers, students and others connected with the food industry.

Seven Steps for Sausage Makers

HINTS for the production of "tangy" flavoured summer sausage, using a new lactic acid starter culture developed by the American Meat Institute Foundation, have been published in a circular by the Foundation.

The 7-step method suggested in the circular requires only 48½ hr. for the production of summer sausage as against 144¾ hr. for the conventional method. The new method is a modification of current processes. Only two major changes are initiated: A pure *Pediococcus* starter culture is introduced during mixing to ensure prompt, natural development of the traditional summer sausage flavour; and the time currently required for processing is shortened, by more than 96 hr., through elimination of three processing steps that are no longer needed.

The new starter culture has been approved by the Meat Inspection Branch of the U.S. Dept. of Agriculture for use in Federally inspected establishments "in the preparation of such kinds of sausage as thuringer, lebanon bologna, cervelat, salami, pork roll and summer sausage." The culture is being prepared in dried form by Merck and Co. Inc., of Rahway, New Jersey.

Poultry Preservation with Antibiotics

Studies on the effectiveness of oxytetracycline and chlortetracycline in inhibiting the spoilage of fresh poultry meat and the effect of short-time icing of treated chicken before cutting up and packaging have been made by workers in the Poultry Science Dept. of Purdue University, Indiana. The need for coating all cut surfaces with an antibiotic solution after cutting up was also investigated.

The investigation was divided into three experiments. The first was a comparison of shelf-life of chlortetracycline-treated and non-treated chicken; the second was the same with the difference that oxytetracycline (*Biostat*) was used instead of chlortetracycline (*Acronize*), and in the third the relative effectiveness of oxytetracycline and chlortetracycline was determined. In all, the effectiveness of the antibiotics was tested with 112 chickens. The use of either antibiotic significantly increased the shelf-life. Dipping parts of chicken in antibiotic solutions after cutting up did not increase the shelf-life beyond that of birds dipped before cutting up.

The holding of chickens in ice for 48 hr. prior to cutting up resulted in a greater shelf-life than cutting up immediately after cooling. The effect was greater with non-antibiotic treated chickens than with those treated with antibiotics.

There were no statistically significant differences in shelf-life of birds treated with oxytetracycline (*Biostat*) or chlortetracycline (*Acronize*) and held at 41°F. Stadelman, Marion and Eller (*Journal Paper No.* 1033, Purdue Agricultural Experiment Station).

▶ The *Precipitron* electrostatic air filter is described and illustrated fully in a new booklet from Sturtevant Engineering Co., Ltd. In this filter airborne particles are electrically charged and then attracted through an electrostatic field to collector plates where they remain firmly attached until the filter is washed.

Jams and Preserves

By G. H. Rauch*

Declining output ★ Soft fruit ★ Frozen fruit ★ Pulp ★ New machinery ★ Research highlights

IN REVIEWING the section of the fruit preserving industry which is principally engaged in manufacturing jam, marmalade, mincemeat, fruit curds and pulps, it is proposed to consider separately, firstly commercial aspects and market tendencies; and secondly technical developments which have taken place in 1956.

The production of jam and marmalade has declined by one-third since 1949, from approximately 328,600 tons in 1949 to 220,800 tons in 1955.[1] For 1956 figures are available only for the first ten months, during which production amounted to 183,500 tons. Final figures for 1956 will probably show a further decline in production. Figures for the manufacture of mincemeat and fruit curds are less spectacular. They have remained fairly steady for the last four years.

The alarming and continuing fall in jam and marmalade output has been the subject of a great deal of speculation and heart searching. Some of the causes are obvious, others are mere conjecture. However, it is impossible to review the industry without considering some of the reasons for the decline in demand. Shortages during the war, followed by continued food rationing, caused an inflated demand for jam and other fruit preserves. It was only natural that after the ending of food rationing in 1953, the demand for sugar-containing preserves should find a new and more normal level. The readjustment of the demand for jam and other preserves has been influenced also by the marked change in the eating habits of the nation, for instance the introduction of the school meal services, and the extensive growth of industrial catering. The sandwich lunch, afternoon tea, and high-tea habit have been greatly affected by these developments. There has been also an increased tendency to "eat out," and finally, there is the vogue for slimming diets, with emphasis on the reduction of carbohydrates. These are some of the causes of the decline in demand for jam, but there is also a far more serious consideration. Falling production has driven some manufacturers into a suicidal price cutting policy, resulting, in many cases, in serious deterioration of quality standards. This policy has been economically disastrous for some manufacturers who, during last year, closed their gates for ever.

The lowering of standards has been particularly marked in the manufacture of jam and marmalade for the catering and bakery trade. A section of the bakery trade, which also faces a serious crisis, has aggravated matters and worsened its own plight by the unimaginative use of jam in flour confectionery. Even a perfunctory examination of an average baker's window display will prove this point. Jam tarts, for instance, which surely should look attractive, are showing the eternal red, green and yellow "traffic light" complex. They generally contain the cheapest type of plum jam or apple mixtures. The same applies to many caterers, who consider jam the cheapest form of fruit filling.

The jam industry's remedy is obvious; an uncompromising insistence on quality production, and improved technical information services to trade users, in addition to modern methods of sales promotion. The smaller manufacturer who cannot compete on equal terms technically and economically with larger units, will have to resort to speciality manufacture. Some progressive and imaginative small factories have already proved beyond any argument that the manufacture of high-class specialities is rewarding.

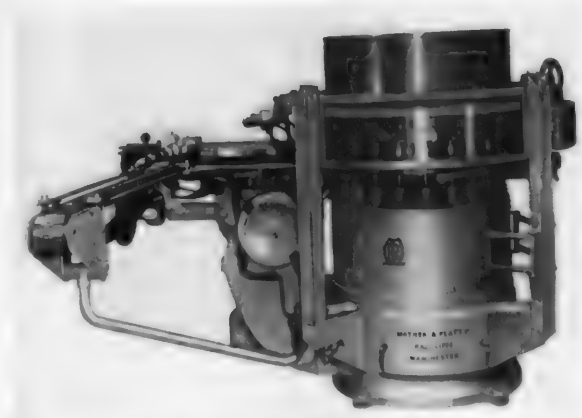
For the export market, specialisation is essential. A recent journey to the U.S. and a market study in the various parts of the country, have convinced me of the very great export potential for high-class British speciality preserves.

RAW MATERIALS

Soft fruit

Last year will long be remembered for its disastrous soft fruit season. A short crop, increasing overheads, and labour shortages, have sent the prices of most soft fruits soaring. The price of strawberry pulp, for instance, had risen by the end of the year by approximately 50% above the price levels of December, 1955, and raspberry and blackcurrant pulp by about 90%. These hectic fluctuations prove the need for closer co-operation between the industry and the fruit growers. Long-term contracts would assist jam manufacturers and growers alike. It is also of great

* Director, Margett's Preserves, Ltd.



Mather and Platt's "Universal" high-speed filling machine.

importance to produce fruit varieties suitable for jam making, a problem particularly acute with strawberries. There is a tendency to grow for yield rather than quality, and this position is only likely to be remedied if growers are assured of a fair price in the long term.

Various interesting reports relating to the horticultural aspects of some soft fruit varieties have been published. There is a notable report of trials with the strawberry variety "Talisman," carried out by Mr. R. D. Reid and Dr. C. A. Wood, of the Mylnefield Auchincruive Station of the Scottish Horticultural Research Institute.[2] Since the first crop in 1948, "Talisman" has cropped heavily, the yield being each year slightly heavier than those from good stock "Climax," varying from 3 tons to 6¼ tons per acre. "Talisman" appears to be highly resistant to red core root rot, and it is also less susceptible to mildew than "Royal Sovereign" or "Climax." Its reaction to virus diseases is still largely unknown.

The fruit is medium to large in size, the colour is light scarlet, rather less bright than "Climax." The texture of the fruit is firm, and it stands up well to transport. Jam making tests showed very good flavour—an altogether promising variety. There are also interesting reports on various varieties of raspberries. The "Malling" series of raspberries prove generally disappointing for jam making. "Malling Promise" and "Malling Exploit" both lack flavour, and the seeds have a tendency to blindness. "Norfolk Giant" appears to be still the best variety of raspberry for jam making.

Frozen fruit

Quick frozen fruit is one of the principal sources of raw material for jam and other preserves in the U.S. There is also an increasing tendency to use frozen fruit for jam manufacture in this country. Processing and storage costs are still comparatively high, but in some varieties of fruit, as for instance, blackcurrants, the high costs are partly offset by other considerations. Blackcurrants strigged after quick freezing show considerably smaller strigging losses, and if efficiently handled are also reasonably free of extraneous matters.

Pulp

The British Food Manufacturing Industries Research Association and the Fruit and Vegetable Canning and Quick Freezing Research Association have issued an interesting booklet on fruit preservation with sulphur dioxide, written jointly by Dr. D. Dickinson and C. L. Hinton, F.R.I.C.[3] This paper pleads for the standardisation of British fruit pulps by

Courtesy of Galbraiths Stores Ltd.

The "Omnia" high-speed capping machine in the left foreground of this photograph is equipped with steam injection. The cap hopper cabinet in the middle background feeds pneumatically to the unscrambling device over the capping machine, via the white trunking shown. A Dawsons' jar washer is seen in the right foreground.

stressing that the percentage of fruit contained in each kind of preserved fruit should be constant. The booklet opens with a paragraph discussing the principles of preservation with SO_2 followed by the description of control tests also giving guidance on simple, scientific production control. Both the hot and cold processes of SO_2 preservation of fruit are discussed in detail. The booklet concludes with a simple formula for the topping up of casks with SO_2 to make up losses which have occurred during storage. The quantity of SO_2 required is calculated as follows:

$$V = \frac{(R - A) \times P \times 160}{S \times 10{,}000}$$

V = Volume of Preservative Solution required.
R = Required concentration of SO_2 in p.p.m.
S = Strength of preservative solution, as SO_2%.
P = Capacity of the barrel in gal.
A = Actual concentration of SO_2 present in the preserved fruit.

Simple methods for the determination of A and S are given in the booklet.

Sugar

Free trading in sugar was restored in January, 1957. In anticipation of the change over, the Ministry of Agriculture, Fisheries and Food raised the price of raw sugar in October, 1956. Sugar prices have since risen alarmingly, playing havoc with the costings of all sugar-containing preserves. An altogether new speculative element has been introduced into the industry which is likely to interfere considerably with its stability.

MACHINERY

This section of the industry has a fine record of progress. There is little doubt that Britain leads the world in processing and mechanical handling of jam and marmalade.

Automatic jam finishing line

Robert Kellie and Son, for instance, have installed an automatic jam finishing line consisting of the following units:

1. One continuous new jar rinsing machine with super-heated steam sterilising section and automatic jar inverter.
2. One transfer jar inspection conveyor.
3. One "Kellie" patent straight line filling machine, for ½-lb., 1-lb., and 2-lb. jars.
4. One water-jacketed jam tempering and mixing tank with swash plate agitating gear.

From the filling machine, the filled jars are automatically conveyed to the capping and sealing machine (Omnia), after which they are automatically transferred in a single line to the feed end of the Hydroseal.

The filled and capped jars are progressed through the Hydroseal in bulk and are subjected to:

(*a*) Steam sterilising for 3 min.
(*b*) Vacuumising for 6 min.
(*c*) Cooling for approximately 30 min.

At the delivery end of the Hydroseal, the cooled jars are automatically discharged in a single line on to a fast-running conveyor where the pool of water which lodges in the hollows of the caps after vacuumising is dispersed.

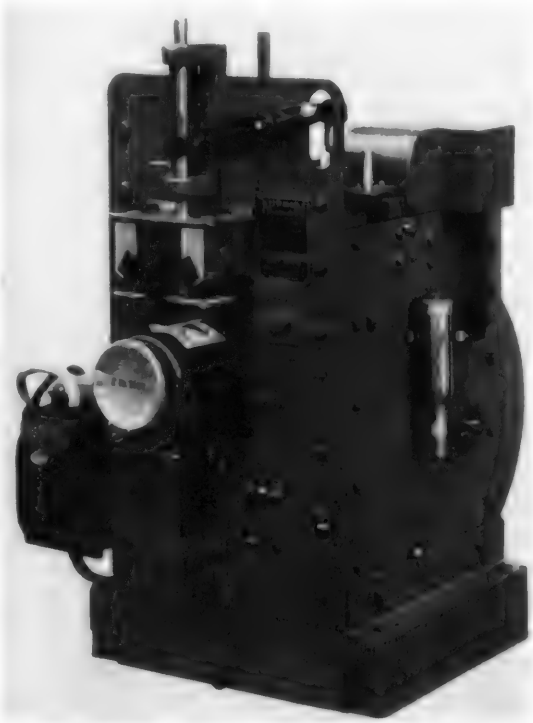
A tunnel drying conveyor is lined up with the Hydroseal discharge, the cooled jars pass automatically through the tunnel where they are dried by a blast of hot air before labelling.

By this new automatic finishing system, it has been established that with an entering temperature of 180°/185°F. (average filling temperature of the product) the processed jars will arrive at the delivery end of the Hydroseal at about 100°F. This temperature will, of course, vary according to the ambient temperature and the temperature of the final cooling water. The important point to note is that by this continuous cooling system, the hottest jars meet the hottest water. For instance, jam at 185°F. is cooled by water at or about 120°F. Finally, jam of 100°F. meets water of 60°F.

It is claimed that this production line is capable of dealing with 47,000 1-lb. jars in 7½ actual working hours, employing between five to seven girls only.

Capping machines for jam

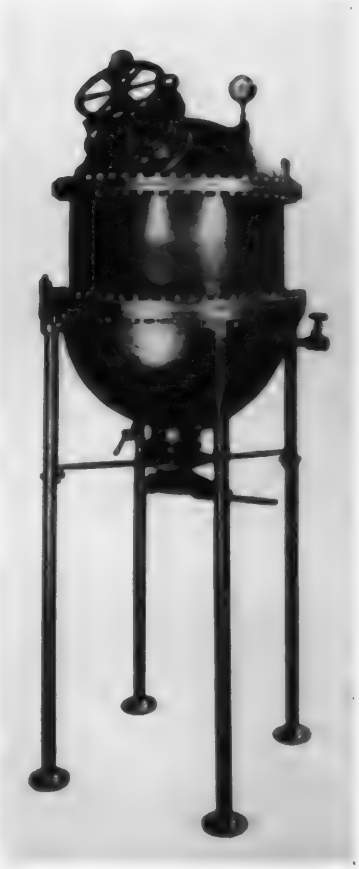
Some jam manufacturers have eliminated the sterilising operation following capping, and are relying for sterilisation upon injection of high temperature steam, as developed by Thomas Hunter, Ltd. (Omnia plant). In this process, the caps are fed to the capping machine down a chute; as the caps are picked off the base of the chute by the jars, a jet of



Semi-automatic strip gumming machine made by D. Trapow.

Courtesy of Nelson Preserving Co. Ltd.

Filling and capping line in a jam factory. In the left foreground is a Kellie high-speed filler. In the centre and on the right of the photograph, are respectively an "Omnia" automatic cap hopper feeding to jar drive attachment between filler and capper and an "Omnia" seven-head high-speed capping machine. The entrance to a Kellie "Hydroseal" is in the left background.



Brierley, Collier and Hartleys' pressure cooker for softening marmalade peel.

high temperature steam passes into the head space.

In an alternative method, where the cap has already been hand applied to the jar, the capping machine is designed to lift the cap to inject steam before final application. In both cases steam is taken from the main supply, and superheated in an Omnia superheater unit.

In this layout, the jars following capping are usually passed through a simple washing tunnel, and placed in stock while still hot in the traditional way.

In the case of the high-speed machines, automatic cap handling equipment is now provided so that the capping machine itself requires very little attention. In certain cases, to avoid spillage at high speeds, the caps are placed automatically on the jars as they leave the filler, so that the jars are covered and protected on their route from the filler to the capping machine proper.

The Omnia cap is also used for the packing of mincemeat in jars, coupled with steam injection. High-speed lines operating up to 120 per min, are installed for this purpose, complete with automatic cap feed.

High speed Universal filling machine

During the past few years Mather and Platt, Ltd., have developed and marketed a high-speed universal filler which is capable of filling up to 500 cans per min. It will handle any cylindrical cans or jars up to the A2 (307-408) can size, and will give an output of approximately 50 gal. per min. It is capable of handling any form of homogenous semi-solid liquid to these capacities. It is also capable of handling jams, purées, and fruit pulps to good effect. It has 20 filling heads, a No-Can-No-Fill arrangement, micro-fill control through a handwheel, and bronze or stainless steel contact parts. The company has recently modified its jam filler, now well known in the jam industry. Instead of a reciprocating pump, a new type of rotary pump is now fitted. It will now give an output of approximately 9 gal. per min. This jam filler has a bronze filling head and non-corrosive contact parts.

Peel shredder

W. Brierley, Collier and Hartley have recently developed machines for shredding peel for jelly marmalade, and for the production of essential oil. A new model handles peel caps by means of conveyor band. This type of machine has hitherto always had to be fed with individual quarter caps of peel.

Strawberry plugging machine

The same firm has also been developing a machine on which they have established very thorough plugging action, to deal with the awkward plugs as well

New hand labelling machine made by Purdy Machinery Co.

as those more simply removed. Research work is still progressing on various methods of feeding the plugging unit automatically.

Continuous cutting machine

Brierley's *Speedy* cutting machine is now being used for a variety of purposes, including cutting pineapples, syruped melon, dried peaches, cherries, almonds, brazils, and other nuts, apart from the previous general use for cutting syruped orange and lemon peel, citron and fresh citrus peel for marmalade, etc.

Electrically heated pan

Brierley's, in conjunction with the Stabilag Co., Ltd., have been developing an electrically heated pan, which might be very useful where no steam supply is available. No insurance test is required, as would be the case with a steam-jacketed unit. Thinner gauge materials can be used, and the vessel can also be made portable, so that it may be brought into operation readily and moved out of position if so required.

Pressure cooker for softening marmalade peel

Brierley's have also recently produced a pressure cooker for the softening of citrus fruit peel. This machine might be of particular interest for the softening of lemon and lime peel. The working steam pressure of this cooker is 60 lb. in the jacket and 20 lb. internal pressure.

"Straight Through" and "Rotary Feed" jam filling machines

Caleb Duckworth, Ltd., jam manufacturers in their own right, have put years of practical experience gained in their own factory into the development of jam-filling machines. The *Straight Through* model is capable of filling ½-lb., 1-lb., 2-lb., and 7-lb. jars with great accuracy and cleanliness. This is probably the best jam filling machine of its kind, with a filling capacity of 34 1-lb. jars, or 4¼ 7-lb. jars per min.

The containers are propelled along the table by fingers which rise behind the jars, and after positioning them beneath the filling heads the fingers drop below the table level to bring more empty jars into position and move those already filled along the table. One operator is required for keeping the machine supplied with empty jars while another is needed for transferring the filled jars to trays or a conveyor.

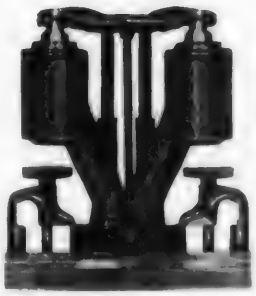
A separate filling head is provided for 7-lb. jars. The *Rotary Feed* filler, while having identical filling mechanism, differs from the *Straight Through* filler in the way that the containers are brought beneath the filling heads. This model is particularly desirable for the "line" where the containers have to be automatically taken forward to a capping machine or a seamer. This machine has a capacity of 34 1-lb. jars, or 17 2-lb. jars per min.

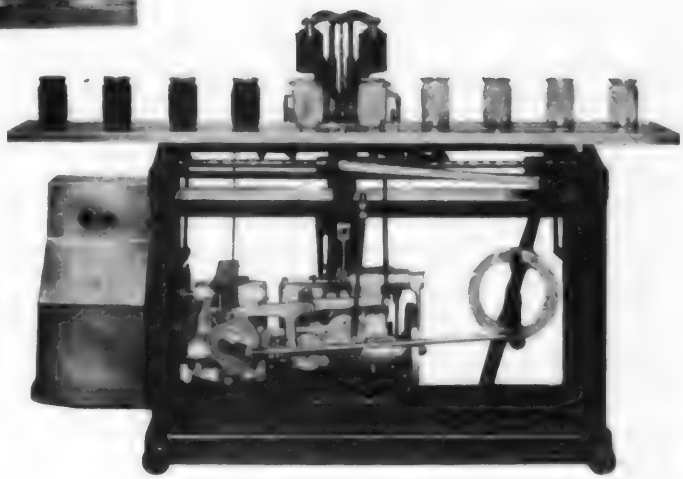
Power operated can opener

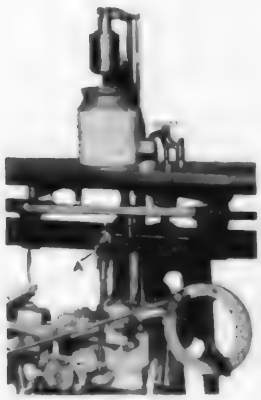
Caleb Duckworth have also produced the *Columbio* power-driven factory can opener. It is very quick in operation, opening a large A10 can or a tall 5-kilo size in 2½ sec. The can is placed on a turntable and locked by a lever. The cutting arm is lowered, piercing the lid and the knob controlling the motor pressed. The lid is withdrawn by a magnet.

The makers claim that the average dented can creates no difficulty, and that the arrangement of the cutting blade permits it to cut the lid as close as is possible to the rim, though they admit that there are many degrees of dentedness and obviously some cans could not be opened.

Kestner continuous film evaporator.







(*Below centre*) **The Caleb Duckworth filler with the guards removed to show the two gear boxes.** (*Left*) **Close up of the filling heads. Unless both wings of the "butterfly" are depressed simultaneously by oncoming jars, there is no fill.** (*Below right*) **Separate filling head for 7 lb. jars. The connecting rod is located in the feed arm and knob "A" half turned.**

Jar washing and sterilising

Jar washing and sterilising machines with capacities ranging from 100 doz. to 1,000 doz. jars per hr. are made by Dawson Bros., Ltd. A typical machine in the middle range has a capacity of up to 300 doz. 1-lb. or 2-lb. jars per hr., and is suitable for either new or soiled returned jars. It is arranged for feeding by hand, but incorporates an automatic discharge.

The operation consists of:

(*a*) Preliminary rinse.
(*b*) Detergent wash.
(*c*) Hot water wash.
(*d*) Final scalding rinse to sterilise the jars.

The machine is robustly constructed with mild steel electrically welded tanks mounted on a channel frame having adjustable feet. Armour plate sliding glass panels enable full vision and easy accessibility to the jets for cleaning. The jar holders are secured to two Renold roller chains.

The machine is complete with all the necessary electrical equipment including appropriate starters, steam traps, dial reading thermometers, pressure gauges, thermostats, steam and water connections, valves, drain off cocks, overflows, etc.

The machine is generally arranged for steam heating throughout. It can be supplied with a drying chamber if required.

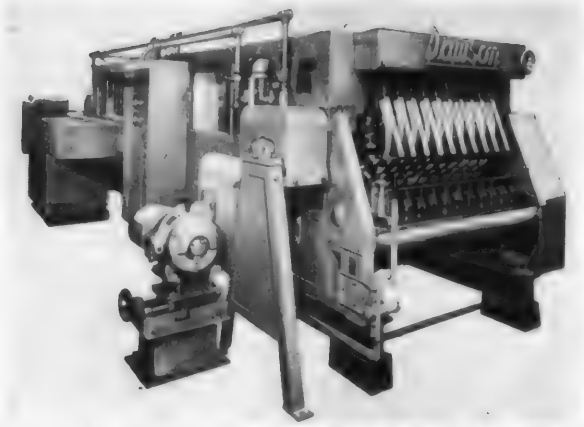
Continuous film evaporation

Some types of jams, fruit jellies, and similar products can be made with a Kestner film evaporator of the serpentine type. No whole fruit jam can be manufactured with this method.

The plant is very compact and consists of four principal items; the feed pump, preheater, calandria, and tangential separator. It is continuous in operation, the product being concentrated in one passage through the evaporator, and in the case of jam, leaving the separator at about 70% solids as the finished product and ready for packing.

The precise method of working naturally varies, but a typical jam process is as follows: The fruit is pulped in the usual way and run into a vat where sugar is added. After standing for a suitable period, the mixture is warmed and stirred to make sure the sugar is fully incorporated. It is then passed through the evaporator and leaves as a finished jam for bottling. The amount of total solids in the product is gauged by refractometer readings and controlled by feed rate and steam pressure.

The operation is continuous, and the product is only in contact with the heating surface for about a minute or so in contrast to the prolonged boiling which takes place in ordinary jam pans. Moreover, since concentration takes place inside the evaporator, the surrounding atmosphere is free from exhaust vapours and steam consumption is reduced. More steam can be saved by utilising the vapours in a



Dawsons' jam jar washing, de-labelling, rinsing and sterilising machine, suitable for 1 and 2 lb. jars. This machine has an automatic discharge capacity of 300 dozen jars per hour.

calorifier for other heating purposes. Corrosive vapours, such as sulphur dioxide from fruit pulps, may be piped away and dissipated in the outside atmosphere. The manufacturers claim that the operator has only to pay occasional visits to the unit.

The plant is supplied in copper/gunmetal or stainless steel depending on individual preferences, capacities vary and can be made to requirements, an average size handling 2 tons per hr. of product.

Semi-automatic labelling

Gumming machines suitable for labelling any size of jam jar from the smallest to a 2-lb. jar are made by D. Trapow and Co., Ltd. The Model 23A semi-automatic machine strip gums the rear surface of the label, leaving a centre portion free from adhesive. It will handle labels and containers of any shape within the sizes $\frac{1}{2}$ in. $\times \frac{1}{2}$ in. to $3\frac{5}{8} \times 3\frac{5}{8}$ for labels and $\frac{3}{8}$ in. dia. or surface to 4 in. dia. or surface for containers. The speed is adjustable to a maximum of 200 doz. per hr. Positioning is claimed to be accurate to within $\pm$·01 in. even on panelled or fluted containers. Like all the labellers in the company's range the Model 23A is almost silent in operation and simple and safe to operate. The machine is started and stopped by means of press buttons operated by the left hand. A label box cut-out is provided, so that the machine may idle when there is a short break in production.

The Model 3C semi-automatic machine gums the whole rear surface of the label. Coding is not possible on this machine because of over-all gumming. The machine has the same speed and handles labels and containers in the same size and range as the 23A. Both machines may be operated on any normal workbench or stand without fixing bolts or attachments. The only provision to be made is a suitable power point, to which the lead from the machine may be connected.

Hand-operated labeller

A small, hand-operated labeller has been developed by Purdy Machinery Co., Ltd., for companies dealing with small runs and a large range, or as a standby in emergencies for those who normally use powered labellers. The operation of the machine —which will apply a single body label to flat, oval, square, and round containers—is very simple. The container is placed in a rest, the handle of the machine depressed, a gummed label is brought forward, registered on the container and firmly affixed.

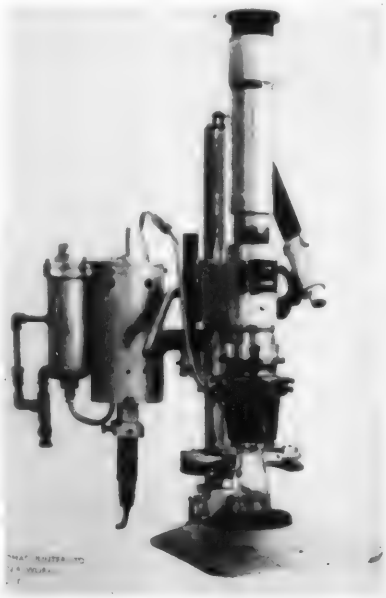
The label holder is fully adjustable and can take a label measuring up to 5 in. by $3\frac{1}{2}$ in. It is built into the handle extension of the labeller as are also the gripfinger and wipes, but contrary to the usual practice there is only one picker plate—a full surface type—which remains stationary. The gum tray is positioned immediately below the picker plate so that any surplus gum dripping through the slots returns to the gum tray. The whole process of gumming the picker plate, picking a label, placing it in position on the container and wiping it, is carried out through an ingenious system of linkages actuated by the downward movement of the handle.

The gumming of the picker plate is by means of a brush which, after having collected a supply of adhesive from the gumming bar which swings in and out of the gum tray, passes over the plate. The use of the single picker plate principle ensures that the labels are automatically gummed all over.

The actual transfer of the label from the picker plate to the container is by means of a small gripper device which draws the label from the picker plate forward over the container, when it is released by the gripper and then is held firmly to the container by the gripfinger as the wipes complete the labelling operation.

Purdy have also successfully used their hand labeller, together with a new type of adhesive, for labelling polythene containers.

The price of the machine is £59, and when full



"Omnia" hand operated capping machine.

production is reached—in about two months—immediate deliveries will be possible.

Vortex processor

The B-W Vortex Processor, which has been used for the processing of jams and preserves in the U.S.A., is now being manufactured in this country by Barry-Wehmiller, Ltd.

The heat transfer in these coolers is accomplished by atomised water sprays which are delivered through a recirculating system designed to be free from clogging. Spray nozzles with a large orifice provide unvarying heat transfer with a minimum of pump horsepower. As the containers enter the machine, the first sprays are tempered to prevent glass breakage. The sprays become cooler as the containers progress until they finally consist of tap water.

Operation is automatic and continuous, and the patented "walking beam" conveyor of the processor moves the containers but does not move from zone to zone itself, thus saving the costs of a cooling and heating conveyor moving throughout the processing zones. It is claimed that the accurate control of time and temperature assures the preservation of original flavour, clarity, and colour, coupled with a longer shelf-life.

RESEARCH

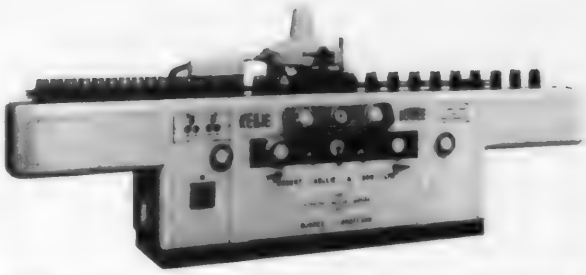
Space permits discussion of only a few aspects of the wide range of research which is being undertaken by the research associations, universities, and horticultural stations in this country and abroad.

"Blindness" of seeds in raspberry jam

This trouble has been investigated by the B.F.M.I.R.A. Twenty-six questions contained in a questionnaire were sent to members of the association, and 30 replies were received. The result of the enquiry is rather inconclusive. The variety of questions put to members implies the wide range of possible causes for this phenomenon. Many purely subjective observations proved to be contradictory. The problem of "blindness" of seeds is likely to remain troublesome for some time ahead.

Deterioration of colour of strawberry preserves

An important booklet on this problem has been published by the B.F.M.I.R.A.[4] J. M. Colquhoun, B.SC., summarises recent technical literature in a clear and concisely written paper. Discoloration of strawberries and other jam varieties during storage is a very serious problem. In this country, the addition of approved colours to jam to counteract the effect of discoloration is permissible, but even the addition of colour will not entirely prevent the development of brown colour on prolonged storage. For exporters of jam to the U.S.A., and some other countries, where the addition of colour is prohibited,



Robert Kellie's type 11FP high-speed automatic straight line filling machine.

the problem of discoloration is even more important. Colquhoun lists the following principal methods for reducing colour deterioration.

(*a*) *Boiling conditions.* Excessive deterioration in colour occurs if the surface of the pan reaches more than 250°F. Vacuum cooking, slow cooking, and the use of liquid sugar, are all said to be beneficial.

(*b*) *Cooling.* After boiling, the jam should be cooled as quickly as possible to below 65°F.

(*c*) *Temperature of storage.* This should be not more than 60°F. and lower if prolonged storage is contemplated.

(*d*) *Headspace.* Since oxygen plays a part in the destruction of the natural fruit pigment, the headspace in the package should be reduced to a minimum. Vacuum packing will obviously be an advantage.

(*e*) *Immature fruit.* The chlorophyll present in immature fruit is transformed into a brown substance on storage, and this brown colour tends to mask the natural colour of the jam.

Storage of jams in light and dark

The B.F.M.I.R.A. has reported on samples of jelly and coarse-cut marmalade stored for 15 months, and raspberry, strawberry, and plum jams stored for nine months, under controlled conditions in light and dark storage.

J. M. Colquhoun summarises the effect of storage on appearance and flavour.[5] The storage conditions did not affect the flavour of marmalade and jam sufficiently to enable an assessment panel to distinguish significantly between the various products. However, a considerable difference was observed in colour between marmalade and jam stored in the light and that stored in the dark. The latter samples were appreciably more attractive.

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[3] Fruit Preservation with Sulphur Dioxide. By D. Dickinson, PH.D., M.SC., F.R.I.C., and C. L. Hinton, F.R.I.C.
[4] Horticultural Aspects of some Soft Fruit Varieties. By J. M. Colquhoun, B.SC.
[5] The Deterioration of the Colour of Strawberry Preserves. By J. M. Colquhoun, B.SC.

Fruit and Vegetable Canning

By Denis Dickinson, M.Sc., Ph.D.*

Sterilisation ★ Shelf life ★ Corrosion of tinplate ★ Inactivation of enzymes ★ Composition of fruit and vegetables

AT THE end of September the Comité International de la Conserve held its Third International Congress on Canned Foods in Rome, on which account 1956 may be remembered as an important year for the canning industry. Whatever may be said about international congresses in general, and it is fashionable to complain that there are too many of them and that they are a waste of time, the C.I.P.C. cannot be accused of holding its congresses too frequently. Also several notable attempts were made to avoid any accusation that it was a "waste of time." One such attempt was the substitution of a series of articles on current problems in the various branches of the industry for the more usual series of lectures on recent advances. The idea was to promote a lively discussion of practical problems between members whose accounts of how they had solved similar problems would be of great value. Some of the papers in this section were certainly provocative, but perhaps they were premature, or perhaps were not strong enough to combat the somnolescent effects of Italian wine and climate. Whatever the reason, the response by way of discussion was rather disappointing. Nevertheless, the papers themselves will continue to be of considerable value for long after they find their eventual way into print in a volume of Proceedings. As a source book of ideas for manufacturers of food machinery this volume should prove to be quite unique.

Processing

The pathogenic food-poisoning organism *Clostridium botulinum* does not occur abundantly and it is not easily found in soil samples. Its isolation from a sample in South Africa—equivalent to the discovery of the organism in South Africa—was reported in 1952 by Knock.[1] Knock and Lambrechts[2] have now investigated the heat resistance of this strain of the organism, and report it as being closely similar to that of the strain used by Esty and Meyer as a basis for the calculation of safe processes for canned low-acid foods. There is no recorded instance of botulism in South Africa, but the isolation of this strain of *Cl. botulinum* by Knock proves that the danger exists.

The promise of a completely new system of processing is contained in an account by Ekelund[3] of the use of hot dry air for the sterilisation of cans at high temperatures under atmospheric pressure. As a heating medium, hot air compares badly with steam owing to its comparatively low heat content. Thus the heat content of a cubic foot of steam can be equalled only by many more cubic feet of air at practicable working temperatures; the air, therefore, must be made to pass through its thermal cycle much more rapidly; in other words, it must be recirculated and reheated at a very high velocity. Ekelund uses sterilisation temperatures in the region of 145-150°C. The main advantage of the system lies in the simplicity of the machines based upon it. No pressure-controlling valves are required. An all-electric machine, such as would undoubtedly be used where electricity is cheap, could be fitted with simple and highly accurate controls. A limitation of the system is that it can be applied only to those sizes of cans which could be sterilised at high temperatures without the application of external pressure to prevent physical distortion.

Radiation sterilisation

C. Olin Ball is well known for his contributions to the calculations of safe processes of heat sterilisation. He has examined the prospects of success for sterilisation by irradiation[4] and concluded that it is most unlikely that irradiation can succeed where heat

* The Fruit and Vegetable Canning and Quick Freezing Research Association.

sterilisation has failed, and that it is illogical to suppose that sterilisation by irradiation could be effective without inducing flavour changes. In any case, there seems no point in sterilising a food without cooking it, as both objectives are normally attained in the single operation of sterilisation by heat. In order to be of any value at all, sterilisation by irradiation must give a product which is superior to the heat-sterilised product at the same cost. Storage does not really come into it, as cold storage is equally available for both products.

Shelf-life

C. Olin Ball[5] has also written a valuable article emphasising the advantage of storing canned goods at low temperatures. All reactions—chemical and biochemical—which adversely affect the flavour, colour, or texture of the food are thus retarded. Along the same lines, Lefebvre[6] has reasoned that storage of canned semi-preserved vegetables at low temperatures might be the answer in the case of those vegetables which are spoiled or drastically changed for the worse by heat sterilisation. Semi-preserves, of course, are consumed in large quantities in other European countries; the majority of them are fish products of one kind or another, and they would be spoiled by heat treatment. There may be scope here for irradiation, although as such products have a high protein content the illogicality pointed out by Ball becomes apparent. In any case, a certain degree of "ripeness" is doubtless demanded by some consumers.

Returning to normal canned fruits and vegetables, although they may be expected to keep better in cold stores, it would be sacrificing some of their advantages to demand cold storage facilities for them. It is one of the tasks of the research organisations to find alternative means of minimising deterioration during storage at normal temperatures. Studies of the mechanism of corrosion of the can fall into this category. One aspect of tinplate corrosion by natural canned fruit syrups was reported upon briefly by A. G. Thomson.[7] Research carried out in the B.I.S.R.A. laboratories at Swansea indicated that Victoria plum syrup contains sufficient natural depolariser to cause the dissolution of about one-hundredth part of the tin on the inner surfaces of a 16 oz. can, that is to say, about 5 mg. of tin, amounting to about 10 p.p.m. on can contents. This figure is in very good agreement with that normally found in plums in lacquered cans after a short period of storage, and thus supports the view that in the case of fruits in lacquered cans it is almost exclusively corrosion of the steel which contributes the hydrogen content. In lacquered cans, also, the dissolution of 5 mg. of tin would in fact strip all the tin coating from the metal not protected by lacquer after fabrication of the can. Chrysanthemin, first shown by Parkinson[8] to be the colouring matter of the Victoria plum, is reported by Thomson to be an efficient depolariser in the corrosion of tin by malic acid, and it is supposed, therefore, that it will assist in the solution of tin inside a can of Victoria plums. It has also been reported by Dickinson and Gawler[9] that in practical canning the shelf life of Victoria plums appeared to increase as the quantity of chrysanthemin they contained increased. If this should be substantiated, the whole explanation may be presumed to be a reduced rate of corrosion of the exposed steel base due to the higher concentration of stannous tin in the syrup resulting from the higher chrysanthemin content of the Victoria plums, although this is almost certainly an over-simplification of the phenomenon.

It has usually been supposed that the chemical reactions involved in the corrosion of tinplate by canned fruits and vegetables bring about a "reversal of potential" which causes the tin to dissolve preferentially; simple electrochemical theory would lead one to expect that the iron should dissolve first. Cheftel and his collaborators[10] have looked more carefully into the theory and have calculated the electropotentials of both tin and iron from the Nernst equation; their results indicate that tin should in any case be anodic to iron, and this is brought about by the low solubility of $Sn(OH)_2$. The calculated difference of potential, however, is only 0·016 volt, so that the relative potentials of tin and iron might be upset by some other substance.

According to Cheftel *et al.*, the biggest factor determining the corrosion potential of tin and iron is the *p*H values of the corroding liquid. As this is the liquid in actual contact with the metal, its *p*H will not remain constant during the corrosion process, and a difference of only 0·3 *p*H between the liquid in contact with the iron (cathode) and that in contact with the tin (anode) would be sufficient to reverse the polarity.

In corroding seams, where diffusion is slow and difficult and may, moreover, be impeded by a shell of unattacked tin-iron alloy, development of a *p*H difference of 0·3-0·4 may readily be supposed.

Cheftel *et al.* have also attempted to explain a further puzzling fact in connection with can corrosion; this is that the quantity of hydrogen found inside a corroded can is never more than about one half of the quantity to be expected from the quantity of metals dissolved. Various explanations have been put forward from time to time, including that of diffusion of the hydrogen through the tinplate. This latest explanation involves a proportion of the hydrogen produced in reducing some of the dissolved tin to the metallic state. While this is logical enough in a plain can, it can hardly apply in a lacquered can where the quantity of tin dissolved is too small to react with an appreciable proportion of the free hydrogen. Yet the facts remain that most hydrogen swells occur in lacquered cans, and that a hydrogen swell can has never been known to burst.

Enzymic changes

The heat resistance of enzymes is often greater than might be supposed, and there have been reports of deterioration of quality in canned goods brought

about by enzymes in packs which were otherwise sterile. High-short processing can give rise to such effects. Esselen and Anderson[11] have reported on the thermal resistance of peroxidase in vegetables. Experiments on the thermal destruction of the enzyme in seventeen different vegetables within the temperature range 215 to 300°F. showed that the amount of heat necessary to prevent a regeneration of enzyme activity during subsequent storage was two to four times as great as that required to inactivate the enzyme on the basis of tests carried out immediately after heating. The *z* values applicable to the peroxidase systems of vegetables are much higher than those of bacterial spores. Marked heat resistance was shown by the peroxidase systems of green beans, broccoli, and turnips.

Although the enzymic darkening of sliced beetroot is well known to vegetable canners, very little is actually known about the changes involved. Clark and Moyer[12] have published one of the few scientific accounts of investigations into the phenomenon. Since the reaction is enzyme catalysed, it can be prevented by the application of heat sufficient to inactivate the enzyme. What may not have been realized before, however, is that a certain degree of heat is necessary to cause the darkening reaction to take place. This heating is interpreted by the authors as being necessary to disrupt the vegetable cells and allow physical contact between the enzyme system, its substrate(s), and air. The enzyme system involved appears to be polyphenoloxidase, and the pigment produced is probably melanin, which is a black insoluble polymer. The reaction can be controlled by measures which reduce the availability of oxygen—such as immersing the sliced beet in a solution of ascorbic acid—but it is, of course, best avoided entirely by cutting out delays after slicing the beet. The enzyme system responsible is one which contains copper. In order to prevent darkening by heat inactivation of the enzyme (applying heat to the whole beets), a centre temperature of 165°F. has to be reached.

Chemical composition of fruits and vegetables

Developing slowly but surely is a system whereby the desirable and undesirable qualities of natural products for preservation may be defined in precise terms. Examples of this are the maturity ratio of citrus fruits and, a more recent development, comparative freedom from leuco-anthocyanins of both fruits and vegetables intended for canning, as an insurance against the development of pink or brown colours on processing. Much is now known about desirable chemical composition, about how it is affected by variety, climatic variables and so on, and about how it may be used for the selection and improvement of cultivated vegetables.[13] It was perhaps to be expected that a society would be formed specially to study these matters, and late in 1955 there appeared the International Association for Research on the Quality of Food Plants. This society is to be finally constituted at a series of meetings in Paris in April 1957. By its very nature the subject must benefit from an international approach and it is hoped that the society will receive all necessary support.

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Condensation Problems

BAKERIES, bottling plants, breweries, confectioners, canneries, pasteurising rooms and, indeed, all food manufacturing plants are particularly subject to condensation problems. These can be avoided fairly easily provided the correct approach is made. That is to say that the amount of excessive moisture is calculated and the most practical and economical method of overcoming the condensation is identified.

Notes on the calculation of this excessive moisture have been published by Mr. L. Gordon Davies, technical director of Colt Ventilation, Ltd., together with information on the best means of utilising this data. The best methods of siting equipment are considered: often this is only possible by tracing thermal currents within the building, thus harnessing them to extract the excess moisture before it can spread through the building. Similarly, when condensation occurs at certain times of the year, it is essential to consider the effects of the winds prevailing at that time over the building, as this might well affect the ventilation rate measured during other wind conditions. Siting of fresh air intake ventilators is also important.

To one dealing constantly with the problem of condensation, there are many other considerations that can be made, *e.g.* can screening be arranged to trap excess moisture gains for immediate removal, or alternatively can hoods be designed to remove the moisture directly above its source, in the case of an open tank? Is condensation occurring because of leaks of moisture laden air through doorways interconnecting between departments? Quite often fitting a return spring to a door has prevented condensation occurring in such circumstances.

Mr. Davies sums up his paper by stressing that though there are hard and fast rules for every condensation problem they can only be intelligently applied by the expert.

Pickles and Sauces

By J. R. Burrell

Colours ★ Salad cream ★ Tomato products ★ Sauerkraut ★ Chutney ★ Stabilisers ★ Sorbic acid ★ Vinegar

THERE has been no reversal of the trend towards mildness of acidity in most products, and pasteurisation, which is a major means to this end, has been making headway. In the past pasteurisation had been used mainly for export pickles, vinegar, tomato ketchup and canned sour cucumbers.

Some people think that with some products, *e.g.* one brand of canned cucumbers, low acidity has been exaggerated to the detriment of palatability, but most products of this type are satisfactory in this respect. The increasing popularity of pasteurisation has affected the type of closures used for the various packs, as has steam jet closing and other means of closing under partial vacuum.

Pasteurisation and hot filling bring their own problems. For instance, heat may distil out phenolic and other odorous substances from the binding materials used in cap liners. Pickle and sauce manufacturers must always inform the suppliers of these components of the temperature to which they will be subjected in the factory.

Permissible colours

There does not appear to have been a colour crisis in the industry, probably because colour is not greatly used. Natural substances such as turmeric and caramel fulfil most requirements.

When the difficulties of finding substitutes are solved, the new rules will probably prove a blessing by (*a*) simplifying recipes and eliminating the ordering of say half a dozen yellows, where tartrazine and one other colour would give all the ranges required, and (*b*) simplifying the work of the colour manufacturers themselves. In the past there has been unnecessary duplication and compounding owing to pressure by individual customers.

While on the subject of colour, it has always seemed anomalous that whereas manufacturers will go to great lengths to find just the desired tint for some products, others, for example, piccalilli and salad cream, are often uncoloured except for turmeric and, in the second case, egg yolk also.

Turmeric, of course, is extremely susceptible to fading to sunlight, and some awful displays of turmeric-coloured products have been seen in shop windows, the colour ranging from subdued mustard to dirty grey-white. The use of a fairly stable colour, such as tartrazine, would seem worth consideration. Water-soluble colours are used for colouring cocktail onions, and here the problem of finding a suitable green under the new proposals might be difficult as there is a tendency for cut onion surfaces and the "veins" to selectively absorb the blue fraction of some green colours in the same way that they sometimes take up caramel from solution. Is this a chromatographic phenomenon?

Salad cream and mayonnaise

Apart from the possible effects of the soaring price of edible oils, there have been no major changes in methods of manufacture or recipe during the period under review. Although there are several new types of mixing devices on the market, these are of a kind in which high-speed centrifugal action is used in a combined pumping and shearing device to achieve an intense dispersing and mixing effect, but there is some doubt as to whether every part of the batch gets similar treatment. The shearing effect is exceptionally successful so that the finely emulsified oil and water constituents, with egg-yolk as the emulsifying agent, may sometimes mask less well-emulsified patches scattered here and there in the batch.

On the whole, therefore, manufacturers tend to retain the standard types of emulsifying unit in which thoroughly well-mixed oil and water phases are forced by high pressure through infinitesmal gaps between two surfaces. By this in-line method, the whole of the batch gets exactly similar emulsifying and homogenising treatment and there is no danger of the unemulsified material on the sides of a vessel acting as focii for the separation of oil and water ingredients at some later stage. The high-speed mixers are nevertheless invaluable to the pickle manufacturer, for no other mechanical equipment has so many uses as these for dispersing gum, cereal thickeners and innumerable other materials used in the food industry.

For preparation of salad cream and mayonnaise, the high-speed plant mentioned is used to pre-mix the batches before emulsification. Often the importance of pre-emulsifying is not realised; a non-homogeneous mixture containing patches of oil and/or watery constituents will not necessarily be rendered homogeneous in an emulsifier. This needs to be stressed

because some operatives look to the powerful emulsifying unit to make good a "broken" coarse emulsion.

A point worth mentioning in connection with salad cream and other oil-in-water emulsions in which gum tragacanth is used as a stabiliser and thickener is that this is very conveniently used in powdered form which not only permits a definite quantity of the dry material to be used per batch, thus saving wastage on the sides of reservoir vessels, but also does away with these potential breeding grounds of the ubiquitous drosophila.

In order to bring about solution, the powder is best well mixed with the other dry ingredients of a batch of the product to be manufactured and the whole lot then dumped into hot (boiling if necessary) vinegar and/or water of the batch, with vigorous stirring. By using the new devices the dry mixing procedure may be omitted, but the writer continues to use the method, for by so doing a homogeneous solution of gum is prepared in a few seconds by the aid of the machines mentioned.

Tomato ketchup

This mildly acid condiment has always been either filled hot or pasteurised. It has helped to create the public taste for mild, sweet products.

The popularity of tomato ketchup is shown by the fact that the ratio of this sauce to others sold is still increasing. A North American manufacturer of this product,[1] who started to use a more convenient (for the table) wide mouth jar, was forced by unfavourable public reaction to return to the orthodox bottle. The larger headspace caused abnormal loss of colour and darkening due to oxidation.

Pickled onion, mixed pickles, gherkins, piccalilli, etc.

The total sale of the comminuted sweet pickles is greater than that of the foregoing, but whether there has been some loss of sales to the sweet variety during this period is difficult to assess because there have been some changes in the industry and some firms have gained sales when others have stopped manufacture for various reasons.

Pickled red cabbage

This seasonal line is probably more than holding its own in spite of various difficulties of supply of the best varieties of cabbage, which are widely thought to be those from Holland.

Sauerkraut

At the moment, no British manufacturer, so far as I am aware, is producing sauerkraut. It is surprising that it is not popular in this country. We have the cabbages (gluts at times), many varieties with hard-packed crisp centres, of high sugar content, yet apparently the Englishman is frightened by the name, for he did not buy when a London manufacturer turned out a very good article just after the war. Restaurants which offer it with the meal usually use canned American sauerkraut.

Large-scale publicity might help popularise sauerkraut, but the conservative British taste would be a tough obstacle, although I have found that when it is offered to people with their lunch most take to it straight away as they do also to segments of bismark herrings and rollmops with salad.

Green and red peppers and aubergines are becoming popular, and here again there might be opportunities for the pickles and sauces manufacturer.

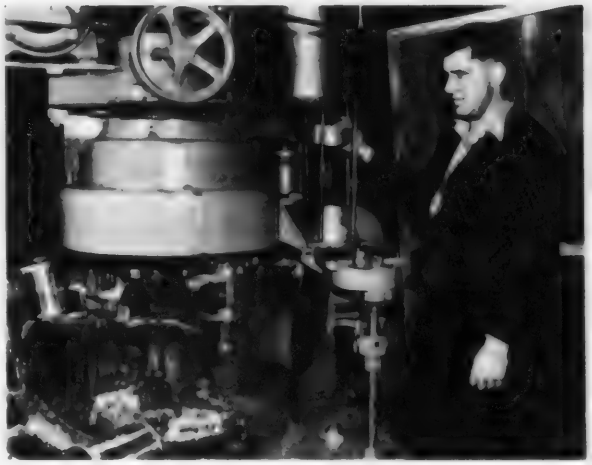
Tomato purée in tubes

Judging by personal experience there is a demand for small containers of tomato purée for use by the housewife in preparing soups and gravies. This will presumably be fulfilled by the use of squeeze tubes,

CABBAGE IN CANS

Are Britons frightened of sauerkraut? Although there are many suitable varieties of cabbage in this country, no British firm is producing sauerkraut. Large-scale publicity could popularise it, thinks Mr. Burrell.

These pictures show three steps in the manufacture of "Silver Floss" at the Empire State Pickling Co., in the U.S.A.—said to be the world's largest sauerkraut factory. After mechanical coring and shredding the cabbage is spread in layers covered with salt in fermentation vats (left) *where it stays for about three weeks. The fermented cabbage—now raw sauerkraut—is heated and mixed before canning. The worker* (centre) *is regulating the preheating tank and the mixers. The filled cans are automatically sealed* (right).



small tins, and/or plastic sachets of tomato paste or powder.

Tomato powder

Samples seen so far are promising, although somewhat caramelised, rather dark in colour and of slightly burnt flavour.

Mango chutney

This is still mainly used for preparing chutneys in which other vegetables or fruit are incorporated, but a great deal is bottled as the pure unmixed article. The very high sugar content of the immediate post-war years—intended to help out the sugar ration—has fallen, and mango slices are now back in the pre-war 55-62% soluble solids range, so that there is now no danger of crystallisation of sugars, which at one time became something of a menace.

Mango chutney with soluble solids around the 60% figure is resistant to fermentative agents. The factors involved have never been clearly isolated, but other fruits in syrup of this concentration and acidity would ferment very quickly under similar circumstances.

Thickeners and stabilisers

Gum tragacanth, by virtue of its well-established and thoroughly explored properties with regard to relative stability to heat and acidity, is still the favourite stabiliser, but alginate esters and the cellulosic derivatives are being used more and more.

All these materials are stabilisers and not true emulsifying agents (such as egg yolk, lecithin, cephalin, sorbitans, etc.), and achieve their effect by increasing viscosity which retards or prevents movement of solid particles or liquids of differing density. Apart from viscosity, the mechanical thickener must not be subject to syneresis.

The use of emulsifying agents proper is under consideration by the Food Preservatives Sub-Committee of the Ministry of Agriculture, Fisheries and Food, so that the status of these materials should receive a much-needed clarification.

Sorbic acid

This has been suggested by Costilow, Ferguson and Ray,[3] as a selective agent for controlling the pickling phases of cucumbers. 0·01% of this acid in an 8% salt solution is claimed by the authors to permit a proper fermentation and cure while inhibiting the growth of surface spoilage yeasts which exist at the expense of the lactic acid produced by the action of the desirable bacteria necessary to the curing process and which eventually produce the hollow, mushy cucumbers known as "floaters." Sorbic acid as a bactericidal and bacterostatic agent has cropped up in North American literature several times of late, but the position as regards its use in this country is not at present established.

Vinegar

Most malt vinegar nowadays is either pasteurised or filtered through micro-filter candles into sterile bottles in order to free it from the acetobacter which convert alcoholic malt liquor into vinegar. Other kinds of vinegar are used in the pickles and sauces industry, notably alcohol and cider types. At least one manufacturer uses a fermented diluted molasses liquor as a base and, at times, has noticed a bacteriostatic quality in his sugary medium which has puzzled him.

Besides its acetic content, vinegar contains the other necessary nutrients for the growth of various types of acetobacter, so these proliferate rapidly in

the presence of abundant air, but no clouding, filming or sedimentation takes place in a full cask or bottle. However, as soon as a significant headspace develops, the bacteria begin to develop rapidly in the unpasteurised vinegar itself or in a product prepared from vinegar, and the acetic acid content is reduced by degrees by the oxidising bacteria to carbon dioxide and water, thus leaving a more weakly acid medium which will permit the proliferation of less acid-resistant types.

Pasteurisation of the vinegar itself and the normal processes of cooking in the case of products containing vinegar, destroy the original acetobacter so that in most cases spoilage is prevented. Careless preparation, such as a last minute addition of a vinegary ingredient after a batch of pickle or sauce has cooled, can lead to infection of the mass by the inoculum thus introduced to produce a one, two or three stage spoilage mechanism, *i.e.* reduction of the surface acidity by the action of acetobacter, then infection by yeasts or other micro-organisms, derived from the headspace, and lastly a growth of mycelial filaments.

Where there has been reinfection, either by careless production methods or by airborne micro-organisms, the effect is enhanced by increase of headspace, caused by usage of some of the product and also, in the case of loose capping, by renewal of the headspace oxygen, by the "mechanical breathing" in the jar caused by changing temperatures, *i.e.* spillage of headspace gases by expansion during the day and drawing in of air following contraction at the cooler night temperatures.

Vinegar processes

An interesting article by H. P. Mollenhauer in FOOD MANUFACTURE,[3] describes the general processes and problems connected with vinegar manufacture. The original Heinrich Frings plant, based on an efficient exploitation of the known facts and methods of acetation using wood shavings, birch twigs, coke or corn-cobs, as bacteria dispersing and aerating media, is fully described, as are the principles of the Frings submerged culture system. In the first plant mentioned, the temperature and air intake is controlled in an airtight generator. Thermometers, mechanised air controllers and water cooling, are features of the process which has great advantages over the old type battery scheme in which the original fermented malt liquor, diluted alcohol or wine, was passed from one acetator to another, stage by stage to a higher degree of acetification.

The first process described is about a quarter of a century old, but the submerged culture system, it seems, must replace it, being more rapid, more efficient and more economical.

No aerating or bacterial dispersion medium (filling) is used, for, as the author points out, the normal arrangement of aeration is reversed and instead of the liquid undergoing transformation being trickled through abundant air, the air is pumped through the liquid, producing turbulence, leaving the bacteria suspended in the liquid itself.

Mr. Mollenhauer lists these advantages of submerged culture over the older method:

1. Faster production, allowing better planning, as larger quantities of vinegar can be produced at short notice.
2. Gains in cost and convenience because of the elimination of the filling material.
3. The new generator can be started and shut off at any time.
4. The type of charge (cider, malt, wine, spirit) can be changed at once without obtaining a quantity of mixed vinegar, as with the old type of generator, where such a change takes days of leaching out all the previous charge with the new one.
5. Since most of the bacteria stay with the vinegar, this has a superior taste; it is smoother and more full bodied.

Peeling by infra-red

E. A. Asselberg and W. D. Powrie describe experimental work in which infra-red radiation was used for peeling apples. They found that at 1520°F. 9-10 sec. was sufficient to achieve the desired result. There were weight losses of about $2\frac{1}{2}$% as compared with the 15 to 18% losses of mechanical peeling.

Apart from apples, the method should be applicable to other fruit and vegetables prior to brining and/or syruping operations, and should interest the pickles and sauces manufacturer.

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Salt Content and Quality of Meat Products

THE salt content plays an important part in assessing the flavour of food products according to D. J. Tilgner (*Die Fleischwirtschaft*, 1956, **8**, 741). But owing to certain suppression and compensation phenomena, the chemical salt contents cannot be regarded as a direct index of organoleptic qualities. On the strength of research at Danzig Technical College, Tilgner proposes a new "Index of Saltiness" as an objective measurement of tastable saltiness.

The proposed index is based on a scale of standard salt solutions, with a concentration varying by 0·1% over the range from 0·8 to 2·2%. For the organoleptic testing of meat products, the taste of the product concerned is compared with that of the standard solutions, and the solution giving the same taste as the sample serves as the organoleptic index of saltiness. Canned ham and similar products should not exceed an index corresponding to the 1·4% salt solution, while bacon and similar uncooked, cured and smoked products should have an index of about 1·8 to 1·9%. A higher value indicates excessive saltiness.

An Improved Method for Estimating Ascorbic Acid in Foods and Biological Material

By H. Moor*

Swiss workers have developed a colorimetric method for estimating ascorbic acid in foods which is claimed to be more sensitive and specific than former methods. Principles and procedure are given in this article.

THERE are several published methods for the estimation of ascorbic acid. In general, they can be divided into two groups. One group comprises the oxidimetric titrations, principally the commonly used titration with dichlorphenol - indophenol, and titrations carried out with iodine[2] or methylene blue.[3] These methods, which are simple and easy to carry out, have the disadvantage that they are non-specific. This lack of specificity becomes especially apparent in estimations of ascorbic acid in foods. In addition to ascorbic acid, foods generally contain other reducing substances which, during the titration, are included in the readings of ascorbic acid so that deceptively high figures are obtained for this substance.

The second group comprises the methods for colorimetric estimation of ascorbic acid. First, the method developed by Roe and Kuether,[4] by which ascorbic acid is first oxidised into its dehydro form and then condensed with 2,4-dinitrophenylhydrazine. Although more specific than the above titrations, this method is not entirely satisfactory because, on the one hand, it may include in the estimation biologically ineffective oxidation products of ascorbic acid, and, on the other, because 2,4-dinitrophenylhydrazine may produce, with other accompanying substances, coloured reaction products.

The method developed by Schmall, Pifer and Wollish,[5] which also belongs to the group of colorimetric estimations, is a considerable improvement. With this method, ascorbic acid is combined with diazotised 4 - methoxy - 2 - nitro-aniline. In alkaline solution this produces a blue colouring matter, the concentration of which is then estimated colorimetrically. In their report Schmall, Pifer, Wollish, Duchinsky and Gainer[6] give a detailed description of this colour reaction. According to this, the reaction of ascorbic acid with diazotised 4 - methoxy - 2 - nitro - aniline produces the 4-methoxy-2-nitro-phenylhydrazide of oxalic acid which, in alkaline solution, produces a blue-coloured salt.

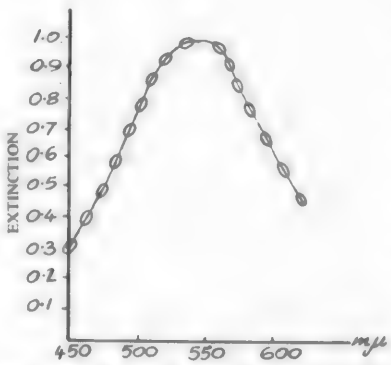

Fig. 1. Absorption curve of the colouring matter produced in isobutanol solution.

The method of Schmall *et al.* is more specific than any other known method for estimating ascorbic acid. Unfortunately, however, we have found that for the estimation of ascorbic acid in foods the sensitivity of this method is not always adequate. Solutions or extracts of solid material with an ascorbic acid concentration of below 100γ/ml. cannot be estimated by this method. As the ascorbic acid content of many foods or biological materials is below this figure, the range of application of this method is limited.

Based on these findings, and as a further development of this method appeared possible, we tried to improve on it and, in particular, to make it more sensitive. We made considerable changes in the procedure; in the first place, the salt is no longer obtained directly in an aqueous solution by adding sodium hydroxide and alcohol, but by extracting from the aqueous solution the reaction product of ascorbic acid with diazonium salt by means of isobutanol. Then the production and extraction of the reddish-blue salt is effected by shaking out the isobutanol solution with 2% aqueous sodium hydroxide.

In contrast to the method of Schmall *et al.*, instead of 4-methoxy-2-nitro-aniline, we use as a reagent component diazotised 2-nitro-aniline. Furthermore, we also greatly improved the estimation of the blind value, inasmuch as the ascorbic acid present is oxidised with dichlorphenolindophenol in a second test.

With these measures we were able to improve considerably both the sensitivity and the specificity of this method as shown in Table 1.

These examples, all of which represent difficult estimations, show that the new method is superior to the other two in specificity and sensitivity. All the results obtained by titration with dichlorphenol - indophenol show figures which are above, sometimes even very considerably above, the theoretical figures. In general, the figures obtained by the method of Schmall *et al.* in the materials analysed are also too high. Compared with the other two methods, with the new method the deviations from the theoretical figures are in general

* F. Hoffmann-La Roche and Co., Basle.

much smaller; even where the other two methods cannot be applied, it is still possible to estimate the ascorbic acid content with the new method up to an accuracy of ±10%.

Table I. Comparison of Methods

Material for analysis(*)	Addition of ascorbic acid	Estimated by: The new method	error %	The method of Schmall et al.	error %	Titration with dichlorphenol-indophenol	error %
Roasted coffee beans	30 mg./10 g.	32	+6·6	38·5	+28	47·3	+58
Skimmed milk powder, roasted	7·5 mg./100 g.	8·1	+8	Not clearly recognisable	+33	28	+270
Red wine	20 mg./litre	22	+10	About 10–15 Not assessable; interference of colour		24	+20
Tonic (Polyvitamin preparation)	380 mg. %	375	−1·3	390	+2·6	420	+12
Flour	10 mg./kg.	8·9	−11	Not assessable		Not assessable	

*All the analysed material consisted of foods in which the possible natural ascorbic acid content had already been destroyed by a preliminary process, or material which contains no natural vitamin C.

Principles of the method

The principles of this new method are:

1. Preparation of the material to be analysed by pulverisation, grinding, homogenisation, mixing, dilution, etc.
2. Extraction of the ascorbic acid from powdered substances or dilution of liquid or semi-solid substances with a solution of metaphosphoric acid.
3. Removal of interfering accompanying substances by shaking out the extraction solution with isobutanol and petroleum ether.
4. Reaction of the ascorbic acid with diazotised *o* - nitro - aniline.
5. Extraction of the yellow reaction compound formed from the aqueous solution with isobutanol.
6. Production of the reddish-blue sodium salt of the reaction compound and simultaneous extraction of this colouring matter from the isobutanol solution by means of a 2% aqueous sodium hydroxide.
7. Measurement of the extinction value at 540 mμ compared with a blind value in which the ascorbic acid had been previously oxidised.
8. Estimation of the ascorbic acid content by means of a recovery test.

After this an undue interference can be exercised on the analysis only by substances which, like ascorbic acid:

(*a*) cannot be extracted with isobutanol and petrol ether;
(*b*) can be combined with diazotised nitro-aniline;
(*c*) lose this capacity of reaction due to dichlorphenol-indophenol; and
(*d*) produce a reaction-compound which can be extracted from acid solution with isobutyl alcohol and produce, in aqueous solution, a reddish-blue Na salt.

The lowest limit of estimation possible by this method is a concentration of ascorbic acid of 0·5 γ per ml., *i.e.* it is possible to estimate without difficulty a content of only 0·5 γ per ml. in solutions or extracts of solid material.

The absorption spectrum of the colouring matter produced in isobutanol solution is shown in Fig. 1. This shows that the maximum absorption takes place at 540 mμ.

Between the extinction at 540 mμ and the concentration there is a linear relationship (see Fig. 2) as long as the concentration of the solution to be tested lies between 0·5-4 γ of the ascorbic acid per ml. Thus, when carrying out the estimation care must be taken not to be outside this range of concentration in either direction.

In order to increase the accuracy of the estimation and to eliminate uncontrollable interference with the material to be examined, it is advisable to ascertain the ascorbic acid content not only by the standard curve, but also by an additional test which is carried out in parallel with the main estimation. The concentration in the additional test must also lie within the range of 0·5-4 γ/ml.

Experimental

Apparatus:

1. A centrifuge with centrifuge vessels with glass stoppers, capacity about 50 ml.
2. Colorimeter (filter 540 mμ).
3. Measuring cylinders, with stoppers, 200 ml. and 100 ml.
4. Volumetric flask, 500 ml.
5. Pipettes and other common laboratory glassware.

Reagents:

1. Metaphosphoric acid solution 20% wt/vol. in distilled water.*
2. Metaphosphoric acid solution 1% wt/vol. in distilled water.*
3. Pure water - free isobutyl alcohol.
4. Isobutyl alcohol saturated with metaphosphoric acid solution (2) (stored over metaphosphoric acid solution).
5. *o*-Nitro-aniline reagent; 400 mg. *o*-nitro-aniline dissolved in 20 ml. glacial acetic acid and made up to 250 ml. with 3N-hydrochloric acid.
6. Sodium nitrite solution 0·08% wt/vol. in distilled water.*
7. Isobutanol-ethanol mixture; isobutyl alcohol (3), absolute ethyl alcohol in the proportion 1:1 (vol.).
8. Low boiling point pure petrol ether.
9. Aqueous sodium hydroxide 2% wt/vol.
10. Standard solution of ascorbic acid; 50 mg. ascorbic acid in 1 litre metaphosphoric acid solution (2).*

11. Dichlorphenol - indophenol solution, about 200 mg./l. in distilled water. In a 100 ml. glass beaker, 200 mg. dichlorphenol-indophenol, together with 50 ml. of distilled water, are brought to boiling point, then cooled and diluted to 1,000 ml. with distilled water. The solution is then filtered through a fluted filter.
12. Diazo reagent: 1 ml. *o*-nitroaniline reagent (5)+1 ml. sodium nitrite solution (6)+2 ml. alcohol mixture (7). (This solution must be freshly prepared immediately before use.)

Experimental procedure (description with the aid of a practical example).

Estimation of the ascorbic acid in powdered milk (should contain 10-15 mg. per 100 g.).

Six grams powdered milk are measured into a volumetric flask and dispersed in 100 ml. distilled water. Then 15 ml. of 20% metaphosphoric acid (1) solution are added and this is made up to the mark with distilled water. The solution is then filtered through a fluted filter and the first 30 ml. of the filtrate are poured back.

If necessary, the filtrate is further diluted with metaphosphoric acid solution (2) so that 100 ml. of the solution contains at the most 200 γ of ascorbic acid. Ninety-five ml. of the filtrate or diluted filtrate are drawn off with a pipette into a stoppered measuring cylinder for each of the three tests, *i.e.* main test (A), recovery test (ZV) and blank test (BV). Five ml. of distilled water are added to the main test in order to make the volume up to 100 ml.

The recovery and blank tests are carried out as follows:

1. *Recovery Test*

To the analysis solution is added a certain amount of the standard ascorbic acid solution so that the addition is equal to the expected ascorbic acid content. (In the example mentioned it would be: an addition of 3 ml. of standard ascorbic acid solution which is equal to 150 γ of ascorbic acid. The volume is made up to 100 ml. with distilled water (with 2 ml. in the example mentioned).

* Must be freshly prepared before the analysis.

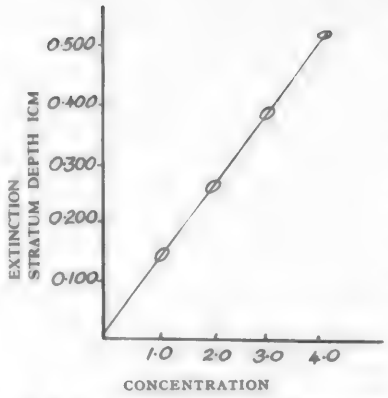

Fig. 2. Calibration curve mμ of ascorbic acid per ml.

2. *Blank Test*

Addition of 5 ml. of dichlorphenol-indophenol solution (11) which should provoke a persistent strong pink coloration. From here onwards all three tests are carried out as follows:

Fifty ml. of isobutanol (4) is added to each test solution, then well shaken and centrifuged. The upper layer of isobutanol is separated and discarded. Then the analysis solution is twice shaken out with 50 ml. of petrol ether (8).

When carrying out the extraction with isobutanol and petrol ether, one frequently may not achieve a clear separation of the layers. In such cases one discards the intermediate layer together with the upper layer, but care must be taken that after the third extraction there remain at least 50 ml. of the aqueous solution for analysis.

Fifty ml. of the aqueous solution are pipetted into a 100 ml. capacity stoppered measuring cylinder, and 2 ml. of diazo reagent (12) are added.

The solution must be well mixed and then left standing for exactly five minutes at room temperature.

Subsequently the yellow reaction-compound is extracted with 30 ml. isobutanol (3). After separation of the layers, 25 ml. of the isobutanol layer are drawn off with a pipette into a centrifuge tube. By adding 5 ml. of sodium hydroxide (9) followed by energetic shaking, a reddish-blue salt is produced and this is extracted from the isobutanol phase. After centrifuging, the isobutanol layer is drawn off and discarded, while the aqueous-alkaline coloured solution is placed in the cell with a pipette.* (In the example mentioned above, the volume of the cell is about 4-5 ml., the thickness of the layer 1 cm.) The extinction values of the main and recovery test are then measured in a colorimeter against the blank test at 540 mμ.

Estimation:

Extinction value for analytical material+addition = a
Extinction value from analytical material without addition ... ... = b
g material for analysis ... = c (contained in the 95 ml. solution analysed and mixed with the addition d)
Ascorbic acid added in gamma ... ... = d

Formula:

$$\frac{d \cdot b}{10 \cdot (a-b) \cdot c} = \text{mg.\% vitamin C.}$$

In the example mentioned above:

a = 0·369
b = 0·174
c = 1·14
d = 150

$$\frac{150 \cdot 0{\cdot}174}{10 \cdot (0{\cdot}369-0{\cdot}174) \cdot 1{\cdot}14} = 11{\cdot}75 \text{ mg.\% vitamin C}$$

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* Turbidity can be cleared in all cases by shaking with 20 ml. of petroleum ether (8).

The foregoing is a translation of a paper in *Mitteil. Aus Dem Geb. der Lebensmittelunters. und Hygiene*, 1956, 47, and is published by special arrangement.

ARTIFICIAL FLAVOURS

Some Aspects of the Science and Art of the Flavour Chemist

By Michael Seidman Ph.D. (Vienna.)

Most people do not realise that materials carrying odour and flavour have been added to manufactured foods or, if they do, assume they are mostly of "natural" origin. This is a tribute to the art and science of the flavour chemist. Some of the problems and achievements of this highly specialised branch of food chemistry are discussed in this article.

Flavour and perfume

IN general flavour and perfume chemistry are very much alike. Both aim at producing effects which will address themselves to the nose—in the case of flavour chemistry also to palate and tongue—in an agreeable way. This additional duty which flavours have to perform in trying to evoke an association with an established taste (of a fruit, or a spice, or a manufactured product like toffee) eliminates *a priori* the use of ingredients harmful for human consumption. Research on this subject is continuously carried out on both new and established aromatics. As a result, coumarin and various colours have been put on the "forbidden" list in the U.S.A., while the use of furfural, because of its alleged carcinogenic properties, is beginning to be frowned upon. The selection of suitable solvents follows a similar pattern and their number is limited.

Flavours are also more difficult to compare than perfumes, as an ingredient which may well evoke the desired odour may produce an undesirable taste.

Another difficulty for the flavour chemist is that he is trying to create familiar tastes. Thus his conception of, say, a strawberry is open to immediate comparison with the genuine article. The perfumer's work, on the other hand, is judged on æsthetic grounds only, and any adverse opinion expressed must carry a certain doubt with it.

Thus the flavour chemist has to create very good imitations. His advantage lies in the fact that he can work on an immense variety of subjects, knowing that there is always room for improvement and a possibility of a closer approach to the natural product.

This possibility will always exist. Natural flavours contain a large number of components, most of them present in minute quantities only. Their combination yields a unique effect. The more of these trace ingredients—in the right proportions and combinations—an essence contains, the better its quality.

Although physical and chemical analytical methods are being continually developed, the flavour chemist's palate and nose are still the finest means for detecting the many shades and nuances of the natural flavour he wants to imitate or the quality of the raw material he is called upon to judge.

A good imitation flavour should, ideally, contain the same components as the natural compound. This, of course, is only possible where a limited number of ingredients are present. In practice, therefore, the flavour chemist, after having established the basic note in his imitation, will try to use raw materials which may not be the same as those in the natural flavour, but which, when compounded, will yield a product of similar character.

Changing tastes

Flavour chemistry is an evolutionary process. Years ago, amyl acetate constituted the pear flavour, but the flavour chemist of today will add many other ingredients to it, and in the process of modification will probably relegate it to second place in the finished product.

In this way the flavour chemist can influence popular taste. Some years ago, a chemical compound which reproduced the "pip" taste of raspberries was discovered and incorporated in raspberry flavours. The public were confronted with a new taste, liked it and accepted it. In the same way a new melon flavour, far more characteristic than any other on the market, has made its appearance. New formulations of plum, cherry and apricot which depart from the old conception of stressing the "stony" part of the fruit are being presented, and as this constitutes a nearer approach to the genuine article there is every hope that they will be acclaimed. The nation-wide acceptance of beverages based on comminuted oranges is further proof of the readiness with which the public welcome good new products.

Taste is as much subject to change as fashion. It is well known that English cuisine has changed quite a lot since the time of the first Queen Elizabeth, when it was considered one of the best in the world. The practice of eating curried dishes and drinking Espresso coffee are other examples of the acceptance of new products in a field usually considered, quite wrongly, one of the most conservative. The ease with which people can travel is accelerating the dissemination of foreign tastes.

All this concerns the flavour chemist, as he is sure to receive requests for new flavours related to the introduction of new foods. These products lay special demands on the flavour chemist.

Trends in flavour chemistry

In many cases liquid essences are giving way to dry flavours. They are, of course, most suitable

for use with a dry base. Being "locked in," they have the advantage of being well protected from oxidation and loss of flavour by evaporation. Their packing is also cheaper.

A good demand is developing for animal food flavours. To the well-known herbal combinations for cattle food and dog biscuits, new and interesting flavours such as carrot, "floral meadow" and fish for cats' food preparations have been added. Work on the production of a truer silage and liver flavour is in progress.

There are many unsolved problems, of course. Bread, tomato, and a general fermentation flavour are only three of many which have, so far, defied imitation. Meat or broth flavours, for a long time considered to be obtainable in dilute form only as a result of a Maillard reaction, have now been prepared in the usual flavour strength and are in the process of being tried out.

These gaps in the list of artificial flavours are due to the lack of the "right" ingredients. Sulphur compounds especially have been sadly neglected. This may be because they carry a rather disagreeable odour with them and are sometimes regarded as not quite suitable for human consumption. Used with caution and skill interesting results—as proved in onion and garlic flavours—are obtained. In the case of roasted coffee they are considered to be even "of major importance with respect to its distinctive character"[1]. As to toxicity, 1 p.p.m. of methyl-*beta*-methyl thiol propionate, which Nature herself flavours in pineapple juice,[2] is quite sufficient to exert an influence on the taste. There cannot be any objection to the addition of this compound to a pineapple essence in a quantity sufficient for the finished article flavoured by it to contain the same amount. In Nature proteins are degraded into flavour-carrying compounds, and this fact should not be forgotten.

Flavour research is producing quicker results than hitherto. This is largely due to the growing co-operation between the organic chemist and the flavour chemist. While agreeing with the President of the Syndicat Nationale de la Parfumerie Française that "it is an error to believe that the perfumer must be a chemist,"[3] it will only be the trained chemist who will be able to ask for special synthetic aromatics to be prepared for him and in this way create new flavours with new effects.

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Hints for Making Malt Vinegar

By Dr. Friedrich Martens

THE production of malt vinegar is based on very old traditional processes, similar to the brewing of beer. Both processes have many similarities but there are also important basic differences.

Like beer, malt vinegar has characteristics which vary, depending on the climate and locality in which it is produced. This is due to the joint influence of meteorological and water-quality conditions on the various biological reactions which take place during production. Consequently, variations in flavour are obtained and these must be taken into consideration in modern manufacturing processes in order to suit the taste of the consumer. Experience has shown that these demands can be met by suitable choice and blending of the raw material and by correct alcoholic fermentation and maturing.

Hassack[1] provides recipes which can still be successfully used today; but all sorts of technical and commercial factors have changed production methods. To a great extent these changes have sprung from a better knowledge of the various reactions during manufacture, but also from the attempt to simplify the process.

What then are the old fundamental facts, and what the new discoveries that must be taken into account?

Malt vinegar comes from malt, *i.e.* germinated barley of approximately the same quality used for brewing beer. The higher its content of malt and the smaller its content of ungerminated grain or other saccharified material, the more a malt vinegar merits the name.

Fermentation

The quality, smell and taste of the vinegar will greatly depend on the purity and odour after the alcoholic fermentation, which produces "malt-wine" (malt liquor wort)—the first step towards malt vinegar. This means that in the course of production the starch must be completely and fully saccharified, the sugar content thus produced must be as high as possible and under modern biological and technical conditions should not fall below 8-9 vol.% alcohol. Further, the saccharified mash must be rapidly heated for pasteurisation and then rapidly cooled, whereupon, if necessary,

small quantities of green malt or diastase can be added in order to achieve a good further saccharification. The material must be more or less ungerminable to prevent further infection of the mash.

The alcoholic fermentation must take place in very clean—preferably sterilised—receptacles, as with beer brewing. The addition of pure, high-fermenting yeast is not essential but often produces such good results, that the additional expense is amply made up by increased yield. Added yeast, by quicker and stronger alcoholic fermentation, contributes to the elimination of injurious micro-organism and results in a higher production of alcohol and a purer vinous taste and character in the alcoholic mash as well as many advantages in the subsequent acid fermentation into malt vinegar.

The mash must of course be free of appreciable quantities of isobutyric acid or other malodorous by-products of undesirable bacteria.

When considerable quantities of unmalted grain are used special attention must be paid to temperature during the mashing process, either to disintegrate albumen or to crack off undisintegrated albumen, so that this shall not interfere with further processes.

The second fermentation, that effected by acetum bacteria, in which the alcohol is broken down to acetic acid, is not merely a process of acidification. If the mash fulfils the conditions of para. 2, fine aromas, such as diacetyl and esters are produced which on maturing make the aroma and flavour of the malt vinegar.

In mash of over 8% alcohol content the acid fermentation automatically eliminates those injurious and undesirable bacteria which transform the acetic acid into carbonic acid—thereby devaluing the end product—and break up desirable aromatics or even build up undesirable ones. Properly produced alcoholic mashes necessarily produce satisfactory acetum bacteria; *i.e.* those that only consume very slowly the surplus alcohol left after acidification (about 0·5 to 0·3%), which are needed for the development of aroma and which do not, during the maturing process, break down the acid into carbonic acid. Desirable bacteria acidify the surplus alcohol slowly without appreciable production of CO_2, so that the production of esters and aroma is increased rather than decreased.

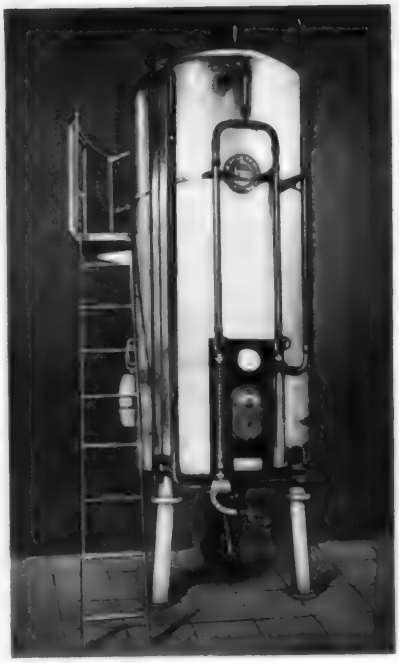

Fig. 1. Vinegar generator.

Filtration

Raw vinegar, after coming from the generators containing the acetum bacteria (Fig. 1) should be matured in vats with sufficient, but not excessive, contact with the air. Filtration immediately after acidification is wrong and prejudices the maturing. Filtration after 2 to 3 weeks can help to prevent faulty maturing and to remove the greater part of the sediment which often develops an undesirable flavour during storage.

During storage and maturing the acid concentration must be carefully watched. If the acid content diminishes, the product should immediately be thoroughly filtered or pasteurised. This control of acid content is, however, only useful if the contents of a vat have been very thoroughly mixed at the start of the storage.

In properly brewed malt vinegar (with at least 7% pure acid) a sharp filtration, such as with kieselguhr, should suffice to maintain keeping quality in bottles. A suitable filter is shown in Fig. 2.

The bottling plant from the filter-tap onwards must be cleaned with hot water or disinfected daily. Otherwise—and particularly in the case of malt vinegar for export to tropical countries—pasteurisation of the filled bottles is preferable. Hermetically sealed bottles are indispensable for keeping quality and for maintaining flavour and aroma.

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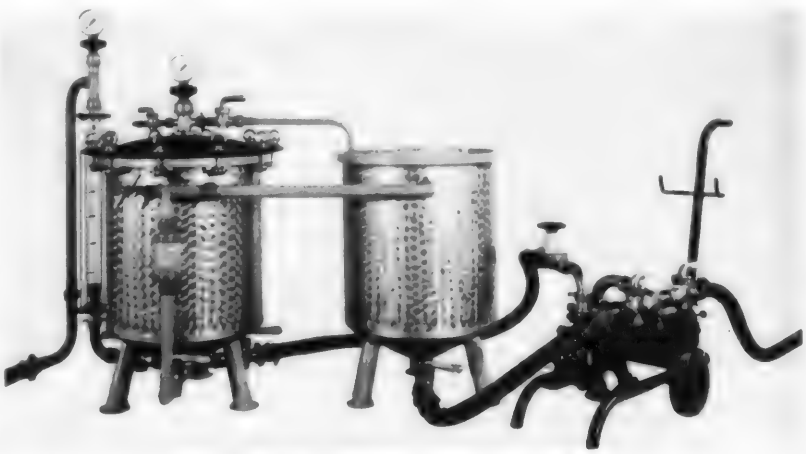


Fig. 2. Suitable filter for vinegar manufacture.

Manufacturers and The Law

PASSING OFF

By Lord Meston

TO SELL merchandise or carry on business under such a name, mark, description or otherwise in such a manner as to mislead the public into believing that the merchandise or business is that of another person is a wrong actionable at the suit of that other person. The form of injury is commonly termed that of *passing off* one's goods or business as the goods or business of another.

In a passing off action it is not necessary for the plaintiff to prove any actual deception or damage. It is sufficient to prove that the practice complained of is likely in the ordinary course of business to deceive the public. In considering whether deception is probable, account is to be taken not of the expert purchaser, but of the ordinary ignorant and unwary member of the public.

It is immaterial whether the false representation about the merchandise or business is made expressly in words or implied by the use or imitation of a mark, trade name, or get-up with which the goods or business of another person are associated in the minds of the public.

There are many types of passing off. Some of the more common are:

(1) A direct statement that the merchandise or business of A is that of B.

(2) Trading by B under a name so closely resembling that of A as to be mistaken for A by the public: Thus, the Universal Life Assurance Society obtained an injunction preventing a company subsequently incorporated from carrying on business under the name of the Universal Life Assurance Association.

(3) Selling goods under a trade name already appropriated for goods of that kind by A, or under any name so similar thereto as to be mistaken for it. A trade name is one which by established usage has become known to the public as indicating the goods of a certain person or firm. There is a distinction between a trade name and a merely descriptive name—the latter may also be a name under which goods are sold but it merely indicates their nature, and not that they are merchandise of a particular person. Everyone has a right to the ordinary use of the English language. A manufacturer cannot prevent another from using a natural expression for the purpose of describing his goods. It has been held that a brewer who was in the habit of putting on his bottles a label with the words "nourishing stout" had no right to restrain another brewer from the use of the like words on his labels. Furthermore, there is no restriction on the use of a word which merely describes the substance from which an article is manufactured.

Confusion

In every case the element of confusion is essential. Therefore A must show that the acts of B of which he complains have interfered or are calculated to interfere with the conduct of his business or in the selling of goods in the sense that those acts of B have led or are calculated to lead the public to confuse the business or goods of A with the business or goods of B. But the element of confusion necessitates comparison and therefore there must be a common field of activity in which both A and B are engaged, however remotely. There was the celebrated case where A had acquired a very wide reputation as broadcaster of children's programmes under the fancy name of "Uncle Mac" and B was engaged in producing and marketing puffed wheat under the same fancy name. It was held that as A was not engaged in producing or marketing puffed wheat, there was no field of activity common to A and B, and B, in using the fancy name used by A, could not be said to have passed off the goods or business of A.

(4) Selling goods with the trade mark of the plaintiff or any deceptive imitation attached thereto. A trade mark is at Common Law any mark habitually attached by a trader to goods manufactured or sold by him in order to indicate that they are his merchandise, and by established usage known to the public as possessing that significance.

(5) Imitating the get-up or appearance of the plaintiff's goods so as to deceive the public: This may take the form of passing off inferior goods by circulating catalogues copied from those of the plaintiff.

(6) Selling second-hand goods as new goods manufactured by the plaintiff.

The remedies in an action of "passing off" may be (*a*) an injunction restraining further passing off, (*b*) damages, or, alternatively, an account of profits, and (*c*) an order for the delivery up of the offending articles or for otherwise dealing with them. Where damages are recoverable they may include damages to the plaintiff's trade reputation.

▶Full particulars of the uses of the *Select-o-Weigh* automatic proportioning system are given in a booklet by Henry Simon, Ltd. Unlike a conventional automatic weigher, the system can handle any material which can be removed from a bin by some form of feeder. It brings the whole of the feeding, weighing, mixing and discharging cycle under the control of a central panel. A full description appeared in the November 1956 issue of FOOD MANUFACTURE (p. 486).

▶A 56-page brochure, the first of its kind, has been produced to provide industrialists considering the location of a factory in Northern Ireland with a straightforward account of the transport services available. It shows that there are five methods of transporting goods across the Irish Sea. Twenty-six companies are listed in the alphabetical section as providing general cargo and passenger/cargo services, or containers and road/transport ferry services. In addition, five air-freight services are operated.

Advances in Food Technology

ANALYSIS

Tin in Canned Foods

A polarographic method has been developed for the routine determination of tin in canned foods, which is claimed to avoid the disadvantages of gravimetric, volumetric and colorimetric methods.

Godar and Alexander's previous work on the determination of tin in foods by polarography after acid digestion, co-precipitation on aluminium hydroxide and solution of the precipitate in hydrochloric acid, showed some failures due to interference with the tin wave by residual nitric acid from the acid digestion. In the new method, this interference is avoided by heating the acid digest with ammonium oxalate. Recovery experiments indicated that with 1 mg. quantities of tin, the accuracy of this method was about ±3%.—J. Markland and F. C. Shenton, *Analyst*, 1957, **82** (970) (1), 43.

OLIVE OIL

Extraction through Electrophoresis

Electrophoresis is a well-known analytical method. In recent years attempts have also been made to find practical applications. One of them is the extraction of olive oil from olive pulp, a process for which, for a number of reasons, conventional methods are not fully satisfactory. The liberation of the oil depends on the breaking down of the colloidal emulsion, calling for the elimination of the activating and stabilising agents of the emulsion. This can be done by a continuous two-stage process of electrophoresis in which the emulsifying agents such as albuminous, pectic and proteinic substances are precipitated at the same time as the oil still remaining on the pulp is extracted. In the process, the hydrophilic group of the emulsifier is attached to the water and the hydrophobic group to the oil. Italian research workers have developed a patented apparatus in which this oil extraction is turned to practical use. First trials have shown promise that the methods will prove technically and economically suited for application on an industrial scale.—S. Castorina, *Oléagineux*, 1956, **11**, 781.

RIBOFLAVIN

Production from Agricultural By-products

It is known that, under favourable conditions, the synthesis of important quantities of riboflavin can be brought about by certain micro-organisms, including bacteria, yeasts and fungi. Certain stocks or species are able to produce riboflavin in quantities sufficient for production on an industrial scale. This proposition is all the more interesting as the requisite nutrients can be found among certain agricultural by-products which would otherwise be wasted, and as there is, on the other hand, a growing demand for riboflavin for pharmaceuticals, feedstuffs, etc. To determine the suitability of agricultural by-products for inexpensive riboflavin production, research has been carried out at the Hungarian Institute for Chemical and Agricultural Technology, Budapest. As a result, it has been possible to specify the most suitable conditions for the preservation of the stock of *Eremothecium Ashbyii*, a micro-organism used for the fermentation process. Animal steep liquor, corn steep liquor, distillery marc and malt sprouts, associated with an appropriate material containing glucide, are suitable substrata for riboflavin production.—J. Hollo, J. Szamel, L. Nyeste, R. Tengerdy, *Industries Alimentaires et Agricoles*, 1956, **73**, 519.

PLUMS

Chemical Constituents

As part of a study of the chemical constitution of Victoria plums grown in different areas in England, analytical methods have been evolved for the colorimetric determination of chrysanthemin (the only anthocyanin present) and for the chromatographic estimation of malic acid. The pectin content was also determined.

The chrysanthemin, malic acid and pectin contents of the bottled plums were then compared with the corrosivity of similar canned samples. It was shown that the corrosivity of the juice as measured by practical canning trials is related inversely to the anthocyanin and malic acid contents and that the pectin content—within the limits of the natural concentrations—appears to have no influence on the velocity of the corrosion processes.—D. Dickinson and J. H. Gawler, *J. Sci. Food Agric.*, 1956, **7**, 11, 699.

MEAT PRODUCTS

Paper Chromatographic Detection of Preservatives

As a first step in a programme to develop a comprehensive range of detection methods for preservatives in meat and meat products, the German Federal Meat Research Institute at Kulmbach has attempted to work out a paper-chromatographic method for the detection of benzoic acid, *p*- and *o*-chlorobenzoic acid, *p*-oxybenzoic acid and its esters, bromo-acetic acid, chloro-acetic acid, dehydroacetic acid, etc. The method permits the reliable detection of some, but not all, of these preservatives, and in some cases, supplementary tests are necessary to establish which of several alternative agents is present.—O. Fleischmann, *Die Fleischwirtschaft*, 1957, **9**, 37.

Machinery and Equipment

CARTON CLAMP

A modified version of the *Hydrum* carton clamp has been developed to lift, transport, and stack a wide variety of cartons and boxes without the use of pallets. It is manufactured by I.T.D., Ltd., for use in conjunction with their *Stacatruc* handling equipment.

It consists of two pairs of clamping plates which are brought together to grasp the vertical sides of the load. Horizontal movement of the plates is effected by two hydraulic rams which permit each arm to be operated independently.

Each clamping plate of the *Hydrum* carton clamp is attached to the side arm near the bottom and is pivoted on three rubber mountings to provide freedom of movement in all directions. This ensures that an even pressure is exerted at either side of each load over the area covered by the plates. Adhesion to the load is provided by an arrangement of corrugated rubber bonded to the steel plates of the clamp. In this way possible damage to goods is minimised and all components of the unit load are kept securely in position during handling operations.

The carton clamp is available in three sizes with clamp openings from 17 in. to 60 in., 24 in. to 72 in., and 29 in. to 84 in.

Battery-electric " Stacatruc " handling a load with the aid of the " Hydrum " carton clamp.

BAG OPENER

Polythene, cellulose film and other bags can be quickly and automatically opened by a pneumatic German-made machine known as the *Agma* (British agents, Auto Wrappers (Sales), Ltd.). As is well known, such bags tend to stick owing to static or atmospheric conditions.

The bag is taken from the stack with one hand and laid flat upon a platform. The hand is placed across the bag and " cupped " to permit the bag to swell when air is blown into it. In this position the heel of the hand is gently pressed on the platform which drops to control the suction valves. The bag is pulled apart by suction and a shutter then opens the air nozzle to permit air to be blown into the bag.

As the bag opens it is gently squeezed to keep it open. Thus it is ready to present to a filling machine. The hold is transferred to the left hand, leaving the right hand free to pick up the next bag and repeat the procedure while the bag held by the left hand is filled. Hand filling can be done with the left hand after the bag is opened.

For larger scale production an operative can open the bags with the *Agma* and place them opened on a tray or conveyor for another operative to fill. Opening speeds of 70 bags a min. are claimed.

The machine will take ordinary size bags up to 6 in. wide for one hand opening and wider bags when both hands are used.

The electric motor is of the universal type and the consumption 210 watts.

SCAVENGING FOR VACUUM PUMPS

A principal cause of deterioration in the performance of high vacuum pumps is contamination by process vapours, of which water is by far the most common.

To overcome the problem rotary high vacuum pumps, manufactured by the Pulsometer Engineering Co., Ltd., can be fitted with air injection scavenging which will handle most condensible vapours to a greater or lesser degree, depending upon their volatility.

Scavenging air which enters the cylinder after the rotor blade has isolated the suction port, can support a substantial quantity of this water vapour without condensation occuring, particularly when the temperature of the mixture is raised by the pump's discharge action. For instance, if a discharge temperature of 195°F. is assumed then each cubic ft. of injected air will carry ·0265 lb. water with it.

It is usual to limit the amount of injected air to a maximum of 10% of the nominal swept volume of the pump, so that a 100 cfm. pump will handle ¼ lb. of water per min. The required discharge temperature is attained on the larger pumps by restricting the flow of cooling water but some models may need heating and the provision of slight back pressure.

Working against full air injection at a maximum temperature the pumps will maintain a high degree of vacuum from 0·1 mm. to 0·3 mm. depending on the particular model, but with reduced amounts of injection and more normal temperatures high degrees of vacuum are achieved down to the normal ultimates of the pumps.

In cases where pumps are dealing with varying conditions which temporarily increase the throughput of water beyond the maximum air injection, auxiliary settling tanks are necessary. It is also necessary to prevent condensation from the exhaust pipe draining back into the pump.

Air injection scavenging cannot be used on circuits where the suction pressure is greater than approximately 8 in. Hg. absolute (203 mm. Hg.).

CREAM WHIPPER

Sparklets, Ltd., have introduced a new cream whipper for caterers.

It has a lever action to replace the knob action on the previous model which was introduced in June last year. The lever enables cream to be dispensed with one hand only, and ensures ease of operation with finger tip control giving instantaneous dispensing and shutting off.

It is claimed that the new model, operated by a special bulb can produce four pints of whipped cream from one ½ pint each of unhomogenised milk and cream. This mixture gives a cream ready for dispensing on to sundaes, fruit salads, etc.

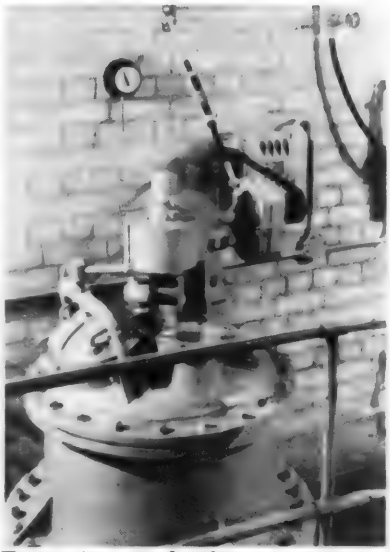
Many of the leading cream producers in this country are now offering various grades of cream suitable for use with the *Spark Whip*.

The new model is priced at 52s. 6d. plus 11s. 10d. purchase tax (64s. 4d.).

Caterers who purchased the original *Spark Whip* can have it converted to the new type by returning it to the firm. Cost is 7s. 6d. plus postage.

SPEED REDUCERS

A range of six single reduction *Torque-Arm* units has been introduced by J. H. Fenner and Co., Ltd., to extend the scope of their shaft-mounted speed reducer. The original speed reducers were intended to solve the problem of dealing with drives requiring speeds of less than 100 r.p.m. at the driven end. Because of the reduction of 15 to 1 in the *Torque-Arm* box, the high-speed economical 1,440 r.p.m. motors could be used and the box itself gave an output speed of 90 r.p.m. The V-belt drive enabled further reduction of up to 6 to 1 to be made, thus bringing all driven speeds from about 15 to 100 r.p.m. well within the scope of the cheaper and more economical electric motors.



Torque-Arm speed reducer on a pressurised mixing vessel.

From a 1,440 r.p.m. motor, a V-belt drive alone, with an effective speed reduction of up to 6 to 1, catered readily for all driven speeds down to 240 r.p.m. There are many machines, however, whose optimum running speed lies between 100 and 240 r.p.m. and for these either a 960 or even a 720 r.p.m. motor had to be used. The new single reduction units, with their fixed speed ratio of 5 to 1, can be used with 1,440 r.p.m. motors to give (in conjunction with the V-belt drive) final output speeds in the 90 to 375 r.p.m. range.

These units are claimed to have the same advantages in this range as the double reduction speed reducers have brought to the field of lower speeds. They are described as practical and economical, easier to install and much more flexible in application than the conventional floor-mounted reduction box. Six sizes, Nos. 11 to 16, are available with a maximum rating of 40 h.p.

Electrically powered nut grader.

PRESSURISED STORAGE

A new system of milk dispensing was used in the milk bar of the National Milk Publicity Council at a recent exhibition. Two 100 gal. insulated stainless steel tanks of a horizontal cylindrical pattern designed and made by the Dairy Supply Co., Ltd., were used to supply milk to 10 dispensing points at the bar. The tanks were air pressurised at 3 p.s.i. from an oil-free compressor. This pressure provided the means for discharging the milk which was fed to the dispensing points through transparent P.V.C. tubing, manifolded for the desired number of connections.

Small agitator units are fitted, their shafts being taken through special seals to prevent the loss of air pressure.

In addition to a combined sight and light fitting for inspection of the contents during operation, the 16 in. manhole cover is fitted with a safety valve to ensure that the internal pressure does not exceed the specified maximum.

The manufacturers say that the vessels might be applied to other branches of food and drink processing, especially where attention to hygiene is important and normal pumping methods are undesirable or impracticable.

NUT GRADER

A new electrically-powered grading battery designed to help food and confectionery manufacturers who grade nuts or beans by size has been developed by the machinery division of R. W. Gunson, Ltd., wholesale seed merchants.

A typical battery is made up of four units—one scale diameter grader and three length graders—that can sort groundnuts, or other nuts or beans of similar shape and size, at a rate of 500 lb. an hour. Each unit, called a *Polygrada*, can be used independently, if required.

It is claimed that this machine will not damage the nuts or beans in any way or cause the kernels to split. Only one operator is needed to work it.

The four-unit battery works on the following principle: the nuts or beans are hopper-fed into the diameter grader which, by means of special vibrators, sorts them into three main grades—large, medium and small. It will also grade out splits. The nuts are then fed automatically through a hopper to the length graders which sort each grade into long or short sizes.

The diameter grader weighs 194 lb., is 2 ft. 7½ in. long, 1 ft. 9 in. high, and 1 ft. 11 in. wide. Price is £172 plus £8 f.o.b. charges and packing.

Each of the three length graders weigh 158 lb., are 2 ft. 8 in. long, 1 ft. 11 in. high, and 1 ft. 2 in. wide. They are priced at £121 each, plus £5 f.o.b. charges and packing.

News Digest

Smedley's Plan 30% More Sales

"A minor revolution" coming

PLANS to increase production of Smedley's quick frozen foods by 30% in 1957 were announced by Mr. Wallace Smedley, chairman of the National Canning Group, recently. He promised housewives a " minor revolution in family catering " within the foreseeable future.

Smedley's, who since 1953 have spent over £3½ million on capital equipment and development schemes, plan to erect a 400-ton cold store at Whyteleafe, Surrey; an extra freezing tunnel—one of the largest in Europe—and a large cold store at their Spalding, Lincs., factory; a fully automatic production line for " fish-sticks " at Blairgowrie and a variety of improvements and extensions at their other factories.

Commenting on the programme, Mr. Smedley said that the frozen food industry was entertaining some very ambitious projects. Smedley's had just entered the field with frozen meat cuts—the first to do so on a national scale—and other far-reaching plans are nearing fruition.

Smedley's have already launched two promotional campaigns—a competition and a special price concession—for canned garden peas which, between them, cover England, Scotland and Wales. In the North and in Wales, housewives buying two cans of Smedley's garden peas will receive a rebate of 4d. The competition, organised south of a line between Birmingham and Skegness, is for prizes ranging downwards from £250 to £25.

Antibiotic ice for fish

Hull trawler owners recently asked the Ministry of Agriculture, Fisheries and Food for permisssion to store fish in *Acronised* ice—ice which has aureomycin powder mixed with it. They say that a series of tests conducted by the D.S.I.R. have shown that fish stored in acronised ice will remain fresh longer than fish stored in untreated ice.

The use of this process is already permitted for fish in Canada. In the U.S. it is used for poultry storage and an application to permit its use for fish is being considered.

Keeping track of milk bottles

A proposal that the registered name of the milk bottling company and the address of the bottling depot should be required to appear on each milk bottle closure has been put to the Minister of Agriculture and Food by the standing joint committee of the 29 London borough councils. This follows a report by Hammersmith borough council on difficulties experienced in conducting legal proceedings in respect of dirty milk bottles under the provisions of the Milk and Dairies Regulations, 1949.

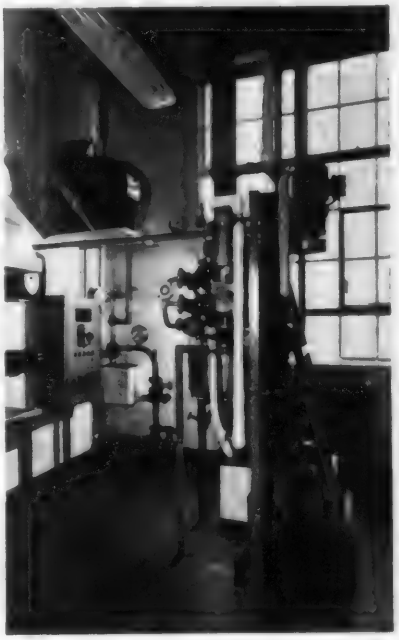
The council said it had not been found possible to obtain information regarding the depots at which the bottles were filled.

The council's standing joint committee have also told the Ministry that it agrees in general with proposals for amending and consolidating three sets of regulations concerning milk. These are the Milk (Special Designation) (Raw Milk) Regulation 1949-54, the Milk and Dairies Regulations, 1949-54 and the Milk (Special Designation) (Pasteurised and Sterilised Milk) Regulations 1949-53.

The most important amendments are (*i*) the simplification of provisions relating to the licensing and registration of milk distributors, (*ii*) the statutory tests for specially designated milks, (*iii*) changes in provisions regarding infected milk and (*iv*) changes required in view of technical and scientific advances and other developments in the industry.

New edible oil laboratories

A new wing was recently opened at the Erith Branch of the British Oil and Cake Mills, Ltd., to house the company's development laboratories. This new unit, under the direction of Mr. M. R. Mills, B.SC., F.R.I.C., is mainly concerned with the interpretation of the results of pure research, in the field of oils and fats, and the development of new products of interest to the consuming industries. Its facilities are also at the disposal of B.O.C.M.'s customers as part of the company's technical service.



A pilot reactor vessel at B.O.C.M.'s new development laboratories. The vessel can be used for deodorising, bleaching and distilling edible oils and for monoglyceride production.

Semi-scale equipment now available includes a miniature oil refinery and hardening plant and a 10-gal. varnish and resin kettle. It is possible to carry out many of the processes commonly used for the refining and modification of vegetable oils intended for both edible and technical purposes.

New pig buying policy

The Fatstock Marketing Corporation, which already deals with at least 85% of the bacon pigs marketed in this country, and 15-20% of the pork pigs, is considering the introduction of a contract system for pig producers.

Food and Free Trade

The committee set up by O.E.E.C. to study the possibility of a Free Trade area in Europe has now submitted its findings to the Ministers of O.E.E.C. One outstanding problem is the question of which products are to be included in the Free Trade system. The U.K. government does not want to include agricultural products and foodstuffs, but this view is not generally shared.

Erections and Extensions

Bovril, Ltd., have had plans prepared for the erection of a building at Merrylee Road, Glasgow.

■

Newcastle Breweries, Ltd., have had plans approved for the erection of a large bottling factory in Heber Street, Newcastle-on-Tyne.

■

The Distillers Co., Ltd., Saltend, Hedon, Hull, are seeking permission to build a factory on the Reform Street Industrial Estate, Hull.

■

Thompson and Foster (Containers), Ltd., have arranged to build a further extension to their factory at Basildon, Essex.

■

Macrea Brothers (Distillers), Ltd., have had plans approved to extend their premises at 56-60, Renfrew Street, Glasgow.

■

St. Albans Co-operative Society, Ltd., Victoria Street, St. Albans, Hertfordshire, are having a bread distribution depot erected in the town at a cost of £10,000.

■

Arthur Guinness, Son and Co. (Park Royal), Ltd., brewers, have plans under consideration for building a warehouse and office building on a site bounded by Anderston, Finnieston and Tunnel Streets, Glasgow.

■

Following the merging of the Unilever Group companies of **Smethursts Grimsby, Ltd.**, and **Birds Eye Foods**, the former company's factory at Ropery Street, Grimsby, is to be extended at an estimated expenditure of £335,000.

■

A factory has been built 4 miles outside Dublin for **Fry-Cadbury (Ireland), Ltd.**, and the production of Cadbury's *Milk Tray* chocolates and Fry's *Crunchie* has started. The company will take over the manufacture of lines produced for them in Ireland under licence for the last 18 years by Clarnico-Murray, Terenure, Dublin.

■

The South Wales divisional headquarters of **T. Wall and Sons (Ice Cream), Ltd.**, is now housed in new premises in Norbury Road, Fairwater, Cardiff. A two-storey office block has been erected opposite the firm's existing site. The ground floor will accommodate the cold-store and offices of Wall's Cardiff ice cream supply depot. The 10,000 cu. ft. brick-built cold store can hold approximately 20,000 gal. of ice cream.

Drawing of new extensions which will add 106,000 sq. ft. to the Nabisco Foods factory at Welwyn Garden City, Herts. Work on the new building started last month and Nabisco hope that it will be completed by December, 1958. Total costs will be about £400,000.

Premium offer promotion

For the first time since before the war, Nabisco Foods Ltd. (formerly the Shredded Wheat Co.) of Welwyn Garden City, is making a premium offer on *Shredded Wheat*.

The offer is a pair of scissors, value 7s. 6d., for 4s. 11d. plus two vouchers. It will be made on a specially printed new pack on which the voucher is printed.

Danish blue cheese promotion

The Danish Cheese Export Board are to launch a big national sales campaign in the United Kingdom through PLAN (International), Ltd. The Danish producers want to substantially increase their output and feel the time has come to promote sales.

Feedstuffs mill

Radioactive tracer methods of controlling admixture of ingredients in feed are used at the new £1¼ million mill built by Silcock and Sons, Ltd., in Renfrew to produce feedstuffs for the Scottish and Northern Ireland market. It has a daily output of varied feeds of some 4,000 tons and operates on mass-production, precision-control methods. Admixture of the ratio of 2½ oz. per 10,000 lb. has been traced by use of a counter which tests the effectiveness of this small quantity in the finished mixture.

Re-equipment of confectionery factory

Automation in confectionery manufacture has been demonstrated at the Coatbridge factory of John J. Lees, Ltd., where new plant has been installed to blend sugar-water-glucose and automatically feed pre-cooked syrup to the boiling plant of the factory. The basic equipment used here is the *Hansella* automatic metering, dissolving and pre-cooking unit. Sugar is drawn from a bulk storage unit which requires to be topped up twice daily. Glucose is piped direct to the *Hansella* unit from a bulk storage unit. The blended syrup is pumped to a pair of balancer tanks above the fondant plant.

The sugar dissolver, which functions automatically, has safeguards against overrunning. The balancer tanks are equipped to shut off the syrup pump and to give an audible warning in the event of a dangerously high level. The dissolver has adequate buffering capacity to avoid spillage. Gravity feed is used to transfer the syrup from the balancer tanks to the cooking pans and fondant plant and the whole system has been devised to allow for daily draining and flushing.

Ice cream mix

The Scottish Milk Marketing Board is seeking support from the ice cream trade in Scotland for a proposed milk ice cream mix project. This follows applications by the ice cream trade for lower-cost manufacturing milk to allow production of a milk-standard ice cream and support by the Board in having such a standard approved as against the present 5% fat content standard.

Milk bottle standards

A new British Standard (2812 : 1957) specifies the dimensions of glass milk bottles of the aluminium foil cap type (other than bottles for sterilised milk) of half pint, one pint and one quarter capacities. Provision is made for milk bottles with locking rings of nominal external diameters of 35, 36, 38, 40 and 44 mm.

It is hoped that the adoption of this dimensional standard will enable the full benefits to be obtained from modern precision types of bottling equipment by allowing such equipment to be manufactured to handle bottles of standardised dimensions rather than for each machine to be specially adapted for each individual user.

Bulk milk handling

The success of the first bulk milk handling project in Scotland has encouraged proposals from another group in Angus to launch a similar scheme. Before allowing widespread bulk milk handling, the Scottish Milk Marketing Board are anxious to ensure first that there are enough farms in a proposed circuit to make it pay; that there is a unit which can take the milk from the tanker; that the equipment in use in the farms is sound and approved by the N.I.R.D., and that bulk milk handling will not cost more than the system at present in use.

Cocoa butter substitute

Loders and Nucoline, Ltd., have produced a fat, known as *Coberine*, which they claim, is equivalent to cocoa butter. They do not specify its composition. The chemical and physical properties of this new product are similar to those of cocoa butter, and in this respect it is superior to previous substitutes. The iodine value and saponification value are also within the limits accepted for cocoa butter. So are softening point, penetrometric readings, extent of supercooling on solidification, and texture, all of which are of prime importance in making chocolate.

Coberine can be used partially to replace cocoa butter in chocolate, since the two fats can be mixed without eutectic effects, and over a wide range of properties without altering the physical properties shown by the separate constituents.

Loders and Nucoline state that *Coberine* limits the tendency to bloom when incorporated in chocolate, and that the finished products will be found to have the same gloss, snap, resistance to finger marking, and feel in the mouth as those in which only genuine cocoa butter has been used. Extensive keeping tests of manufactured products containing *Coberine* have given satisfactory results.

The replacement of cocoa butter by *Coberine* presents an economy (the price is from 3s. to 3s. 3d. per lb.), but the new fat lacks the natural flavour of cocoa butter, and is not proposed as a complete substitute.

Salt standard

A revised British Standard (998: 1957) specifies requirements for dried and undried vacuum salt, as packed by the manufacturer, for butter and cheese making.

Provision is made for limits of moisture and impurities and for the fineness of grain of dried salt; and methods for sampling and analysis are specified.

The revised standard includes the following main changes:

(*a*) The chemical purity is now given as 99·6% minimum calculated on a moisture-free basis.

(*b*) The sulphate limit is now raised to a maximum of 0·3%.

(*c*) The iron limit is now reduced to a maximum of 0·001%.

Changes of address

The sales division of Waeco, Ltd. (Fumite Division), previously at 120-22, Victoria Street, S.W.1, has been moved to the firm's headquarters at High Post, Salisbury, Wiltshire.

Air Control Installations, Ltd., have opened a new branch office at Cross House, Westgate Road, Newcastle-on-Tyne, 1 (Telephone: 28861).

The North Eastern area sales office of Midland Silicones, Ltd., has been moved to more extensive premises at 5-7, New York Road, Leeds, 2. (Telephone: Leeds 26768, telegrams: Midsilicon, Leeds). The area sales manager is Mr. R. Nattrass.

With one exception, all head office departments of the Shell Chemical Co. Ltd., are now located in the company's new building at Marlborough House, 15-17, Great Marlborough Street, London, W.1. (Telephone: Gerrard 0666, telegrams: Shellchem, Wesdo, London.).

The plastics and resins department remain at Norman House, 105-9, Strand, London, W.C.2.

Tea transport by elephant-power! George Payne and Co. Ltd., tea blenders and packers, have evolved an ingenious and topical publicity stunt from petrol rationing which may also solve their delivery problems. The elephants in this convoy near Manchester were borrowed from Belle Vue zoo.

OBITER DICTA

● So quiet, you can hear the fizz in your drink.—*Advertisement for new Britannia airliner.*

● Krushchev's career analysed. The basic mixture: vodka and other people's blood in equal parts. —*Book review in Sunday Express.*

● Wine in tins? Why not? I have sampled wine from a tin in Brazzaville and it tasted no more or less like red ink than bottled "vin ordinaire."—*Letter to Daily Express.*

● Five cases containing about £25 worth of cat and dog meat will be sent from London to Vienna—in free aircraft provided by B.E.A.—in order to feed the pets of Hungarian refugees.—*The Times.*

● I am a long-distance lorry driver, out of work owing to the petrol shortage. Yet a brewery is able to charter a plane to carry two cases of pale ale to Monaco for Princess Grace, just because her doctor said beer seems to be doing her good.—*Letter in Daily Sketch.*

● There was rock 'n roll for visitors to the Packaging Exhibition at Olympia this year. There they found—no, not Mr. Presley—a free stick of rock neatly fitted in a sample roll of "Sellotape"—*Publicity handout.*

● My wife has composed an impressive work entitled "Le Retour d'Alaric" by hanging a sheet of manuscript paper behind the gas stove whilst frying some pork sausages, and then inking in the splodges of fat.—*Letter to Radio Times.*

● One of Al Read's characters claims that his family is the only one in the country with a dried pea in the syrup, but I am sure that hundreds of families must share this distinction.—*Correspondent to Manchester Guardian.*

● M. Andre Simon tells us that rum, the sober form of the more flamboyant names Rumbullion, Rumbustion and Rumbooze of olden times, is the spirit distilled from the fermented sugar-cane juice or from cane molasses. Will there, one wonders, ever be a Beet Sugar Rum?—*Travers Circular.*

● Now is the time for all good shots to turn their attention to pigeons, farming's number one pest. Pigeon shooting is a job for the expert; even with subsidised cartridges there is small margin for misses. Experiments with narcotics have so far proved unsuccessful because pigeons are so much tougher than most other birds.—*The Times.*

Company Profits and Prospects

Profitable cyder

Trading profits for Whiteways Cyder increased from £188,978 in 1954-55 to £214,038 for the year ending November 30 last. Net profits increased £10,138.

*

Brewery merger talks

Ind Coope and Allsopp and Benskins Watford Brewery are discussing the possibility of merging the two companies by means of an exchange of shares.

*

Liebig's profits fall

The Group profits of the Liebig's Extract of Meat Co. fell sharply from £1,885,265 to £1,502,483 in the year to August, 1956. This sudden fall is attributed partly to the new exchange regulations introduced by the Argentine government in 1955, leaving sterling remittances free to find their own level.

*

Colour manufacturers' acquisitions

Williams (Hounslow), Ltd., aniline dye manufacturers, of Hounslow, Middlesex, have recently acquired the total share capital of J. C. Oxley's Dyes and Chemicals, Ltd., manufacturers of aniline dyestuffs, auxiliary products and chemicals, of Dewsbury, Yorkshire.

They have also acquired the share capital of the Heckmondwike Chemical Co., Ltd., manufacturers of fertilisers, insecticides and allied products, of Heckmondwike, Yorkshire.

*

Guinness outlook less good

The large rise in profits of Arthur Guinness Son and Co., Ltd., is not expected to be repeated in the present year, and the chairman, Lord Iveagh, thinks they will be fortunate if sales and profits are maintained at their present level. For the year under review, gross profits rose by nearly £0·75 m., due to record beer sales.

The licence to the Goebel brewery of Detroit has been terminated by mutual agreement, since the company is not prepared to adventure the heavy expenditure needed to break into the "tough beer world of America."

Autopack agents

W. W. Barkworth and Co. of 40, St. Petersgate, Stockport, Cheshire, have been appointed sole agents for Autopack equipment for the counties of Lancashire and Cheshire.

Horticultural marketing

The committee on Horticultural Marketing, set up in March, 1955, to inquire into the marketing of home-produced and imported vegetables, fruit and flowers, have published their report. They recommend that a London Markets Authority should be established to reorganise Covent Garden market and create a new market to serve N.W. London. They say there is also need for a central organisation to handle market intelligence, promote better marketing techniques, etc.

Obituary

MR. FREDERICK MORRISS ROBERTS, a director of A. Boake Roberts and Co., Ltd., died on January 12. He was 82. In his early days with the company his chief interest was in the brewing industry, this then being the major field of the company's products. In later years he concerned himself more particularly with the financial control of the business.

He was joint managing director from 1933 to 1943 and vice-chairman from 1925 to 1952. He was also one of the original directors of Sugar and Malt Products, Ltd., a company that was merged with the firm of Manbre and Garton, Ltd.

*

The death occurred on January 12 of MR. GUSTAVUS EDWARD HAVINDEN, founder and chairman of G. Havinden, Ltd., national distributors to the food trade. Mr. Havinden had a long and eventful life of close on 81 years, the greater part of which he spent in food distribution. Commencing his business life in the insurance world, he quickly found that this did not appeal to him, and started his own flour agency business travelling the Medway towns of Kent, in the early 1900's, mainly by bicycle. During the First World War he held an important appointment with the Watford Manufacturing Co., makers of chocolates and confectionery. In 1922 he founded G. Havinden, Ltd. At various times he held directorships in other companies such as Newball and Mason, Ltd., Bantam Products, Ltd., Lushus Foods, Ltd., Honeybee Farmers, Ltd., Roberts Windsor Soap Co., Ltd., all of whose products were distributed through the Havinden organisation.

Mr. Havinden had travelled widely, particularly in Empire countries in search of interesting food products to import for this market. Of genial and kindly personality he quickly made a large number of personal and business friends, and was noted for his progressive ideas in marketing, salesmanship and distribution. He was a Freeman of the City of London. His last years were spent in retirement at his country home near Sudbury, Suffolk.

Forthcoming Events

Society of Chemical Industry

Food Group

March 13. "The Production of Sterilised Milk." By L. F. L. Clegg. 6·45 p.m. 14, Belgrave Square, London, S.W.1.

March 27. Symposium: "The Physico-Chemical Properties of Proteins with Special Reference to Wheat Proteins." M. A. Cookson, P. Halton, J. K. Pace, S. V. Perry, A. G. Ward and Prof. J. B. Speakman. 10 a.m. 14, Belgrave Square, London, S.W.1.

Oils and Fats Group

March 13. "Lipids and the Problem of Atherosclerosis—A Survey." By Prof. R. A. Morton, F.R.S. 7 p.m. Nicholson Theatre, Department of Organic Chemistry, University of Liverpool.

*

Royal Society of Health

March 6. Symposium: "The Composition and Nutritive Value of Flour." Prof. A. C. Frazer, and Dr. Hugh Sinclair. 2·30 p.m. 90, Buckingham Palace Road, London, S.W.1.

Manchester food exhibition

For the first time Manchester is to have a Food, Cookery and Catering Exhibition. It is to held in the City Hall from September 10 to 21, 1957.

Gas exhibition

More than 10,000 industrialists visited the "Gas At Work In Industry" Exhibition during its ten-day run, from January 22 to February 2, at the Royal Horticultural Hall, Westminster. Over 500 enquiries were logged. The full outcome of the exhibition will not be known for at least two years.

Symposium on spores

During the Summer Conference of the Society for Applied Bacteriology to be held in Leeds from July 2 to 5, a symposium will be presented on the subject of "The formation and germination of bacterial spores." Contributors will come from Scandinavia, Europe, U.S.A., Canada and Great Britain.

Further details can be obtained from G. Sykes, Boots Pure Drug Co., Ltd., Microbiology Division, Nottingham.

PEOPLE

MR. GRAHAM P. SMEDLEY, joint managing director of Smedley's', Ltd., has been appointed to the Scottish horticultural advisory committee by the Minister of State for Scotland.

▪

MR. W. J. COLE, who has represented the Cambridge Instrument Co. in the Liverpoool area for the last 27 years, has now retired. He is succeeded by MR. K. W. TREVATT.

▪

MR. W. G. BALDOCK, manager of the home sales department of Williams (Hounslow), Ltd., aniline dye manufacturers, retires this month after 33 years' service with the company. His duties will be taken over by Mr. A. T. YOUNG, the overseas sales manager.

▪

PROF. B. S. PLATT, C.M.G., M.SC., M.B., CH.B., PH.D., has been appointed a member of the Food Standards Committee in place of PROF. S. J. COWELL who has retired. Dr. Platt is Professor of Human Nutrition at the London School of Hygiene and Tropical Medicine.

▪

MR. JOHN EDEN, until recently sales and contracts manager for Birtley Engineering, Ltd., has joined W. P. Butterfield, Ltd., engineers and tank manufacturers, as contracts manager. Butterfield's factory at Shipley is being extended and a new bay covering 18,000 sq. ft. is scheduled to come into full production by July.

▪

MR. G. A. RAINEY was elected chairman and MR. L. E. GRAY, O.B.E., vice-chairman at the annual general meeting of the Tea Trade Committee held in London recently. Mr. Rainey is a member of the firm of Alex. Lawrie and Co., Ltd., and represents the Indian Tea Association (London), on the Committee. Mr. Gray is a director of Brooke Bond and Co., Ltd.

▪

Three new chairman have been elected for panel research committees of the British Food Manufacturing Industries Research Association for a period of three years. They are: *Cocoa and Chocolate*, MR. A. NORTON (Rowntree and Co., Ltd.); *Jam*, MR. H. THREADGOLD (Wm. P. Hartley, Ltd.); *Sugar Confectionery*, DR. A. A. HOUGHTON (Mars, Ltd.).

▪

MR. A. S. ALEXANDER, of Westwick Frosted Products Ltd., is the president of the National Association of Quick-Frozen Food Processors for 1957. The new address of the Association is Kingscote House, 1-2, Kingscote Street, London, E.C.4 (Telephone: Central 7474).

Mr. W. Mitchell

MR. W. MITCHELL has been appointed secretary of the National Association of Quick-Frozen Food Processors. A familiar figure in the grocery trade following nearly 40 years' service with Unilever's margarine interests, Mr. Mitchell has been closely associated with the processing and marketing of quick-frozen foods virtually since their national introduction here in 1946.

From 1947 and until his retirement in 1956, he was sales director of Birds Eye Sales, Ltd. He was among those who first mooted the formation of a Processors' Association in March, 1949, was a founder member, the first chairman and subsequently represented his own company each year on the Executive Council.

▪

DR. W. N. STOKOE, PH.D., B.SC., F.R.S.E., F.R.I.C., assistant works manager of the Stork Margarine Works at Bromborough in Cheshire, has retired, on medical advice, from Van den Berghs and Jurgens, Ltd. MR. D. H. CLARKE, who was development manager at the company's works at Purfleet in Essex, has succeeded him.

Dr. Stokoe worked as a senior chemist at the Admiralty during the First World War and afterwards became research chemist at the Craigmillar Creamery Co., Ltd. (Edinburgh), where he was appointed works manager in 1920. He was appointed technical director of Craigmillar in 1932, was transferred to Bromborough as a member of the management committee in 1948, and became assistant general works manager in 1951.

Mr. Clarke, who is 30, joined Unilever, Ltd., in January, 1949. After 18 months with Crosfields at Warrington, he joined Van den Berghs and Jurgens, Ltd.

MR. R. NORTHOVER, company chief engineer of T. Wall and Sons, Ltd., has resigned after 36½ years' service with the firm. Mr. Northover, who is 65, joined the company in 1921, and laid down the first ice cream plant at Acton in 1922, followed by the first plant for solid carbon dioxide. Latterly, as chief engineer, his activities have extended particularly to refrigeration problems. Gifts to him on his retirement included a motor-car.

▪

MR. C. E. BRADFORD has been appointed general sales manager of Nabisco Foods, Ltd. (formerly the Shredded Wheat Co., Ltd.). He is well known in the grocery trade. He was with the sales division of Colgate-Palmolive for five years. MR. JACK SEAR, the company's sales manager, has been assigned to special duties in the sales department in connection with the expected keener competition in 1957 in both the cereal and cake-mix markets.

Regional food controllers

The Minister of Agriculture, Fisheries and Food has selected the following officers as the Ministry's regional controllers:

Northern Region—Mr. F. M. Kearns, M.C.

Lancs and Yorks Region—Mr. K. Harrison Jones.

West Midland Region—Mr. W. J. B. Hopkinson, O.B.E.

East Midland Region—Mr. E. Ll. Harry, O.B.E.

Eastern Region—Mr. J. H. Perrin.

S. Western Region—Mr. H. Pitchforth.

S. Eastern Region—Mr. J. W. Pugsley.

It is expected that these officers will take up their new posts on April 1.

The list does not include Wales since Mr. J. Morgan Jones, C.B.E., already holds the appointment of Welsh Secretary.

Sausages on TV

Mr. P. Helmut Hilgeland, managing director of Foodtech, Ltd., recently appeared on commercial television to describe how sausage-making has evolved from crude beginnings (illustrated by machines, including a replica of one which dated back over 100 years) to the present day. Modern sausage production was illustrated by machines which included a rotor chopper, a filler, a twist linker and model sausage drier. Sausages were shown being produced at the rate of 130 a min., but for technical reasons it was not found practicable to demonstrate Foodtech's latest type of linker, which has a maximum production of 185 sausages a min., the fastest in the world.

Food News Overseas

Cingalese sugar factory

A sugar factory with a crushing capacity of 2,000 long tons of cane sugar per 22-hr. day, is to be erected in the Gal Oya Valley, Ceylon. It will be part of the Gal Oya development scheme.

India develops sugar industry

A development plan for the sugar industry in India, which aims at producing 2·16 million tons in 1957-8, has been approved by the Development Council for the Sugar Industry. It provides for the erection of 22 new factories and expansion of production at 17 existing factories. This will raise the installed capacity of the industry by about 0·35 million tons, and by a further 0·25 million tons when the new factories start production. Investment in the sugar industry during 1957-8 is estimated at Rs. 240 million, of which Rs. 190 million will be spent on the new factories and Rs. 50 million on the expansion of existing ones.

A scheme has also been approved for experiments in pre-harvest spraying with sodium salt in an attempt to increase the sugar content of the cane crop.

Bakers' meeting in Munich

During the run of the International Bakers' Exhibition, which is to be staged in Munich in May, 1958, by the Verein für Handwerks-Ausstellungen und Messen e.V., the Paris International Union of Master Bakers (Union Internationale des Maîtres-Boulangers) will hold an international meeting in Munich. This meeting coincides with the celebrations for the city's 800th anniversary.

Kenya tea factory

A new tea factory, costing £55,000, is nearing completion at Kanjari in Kenya and is expected to open in April.

Describing this as "the focal point of one of the most ambitious schemes for the development of African farming in the Central Province," a special report received from London from the Local Head Office of Barclays Bank D.C.O. at Nairobi, says that the factory will provide a commercial outlet for the scheme to plant 5,000 acres of tea in 10 years on individual Kikuyu small-holdings. The scheme, which includes the provision of roads, nurseries and transport, is controlled by a Board.

Built of stone with a roof of corrugated iron, the factory is designed on modern lines with a withering room, fermenting and rolling sheds and a drying store. It stands in the centre of the tea-growing area, 11 miles north of Karatina township, which is on the Nyeri-Nairobi railway line.

Near the factory are 22 acres of tea on experimental plots run by the Department of Agriculture. These and other experimental plots in various parts of the district have proved successful. Already 172 acres of tea have been planted on half-acre plots on African farms, and it is planned to plant another 312 acres in 1957.

Czech artificial casings

Artificial casings for smoked meats are being made in a plant at Korenov in North Bohemia, Czechoslovakia. The casings are made from a synthetic material called "cutisin" the gauge of which is 0·025 mm. Czechoslovakia is one of the five European countries which manufacture artificial casings.

Frozen fish in Portugal

A new firm called Sociedade Nacional de Transportes e Distribuicao de Peixe Ld^{a}. (SOPEIXE) of Rua Roberto Ivens 179, Matosinhos, Portugal, has been set up for the importation, distribution and retail sale of frozen fish. It is reported that a wide distribution network has been set up and properly equipped. Six fishmongers' shops with refrigerators have been opened in the principal provincial towns of the North and as many more will be opened shortly. The first shipment has been received at Viana do Castelo; the company is said to have placed a contract for 20,000 tons of fish in Germany, and the Minister of Economy already to have authorised the importation of 3,000 tons. In Oporto it has recently been possible to obtain Norwegian quick frozen fish fillets retailing at 22 to 25 escudos per kilo, which is cheaper than the normal prices of 32 to 35 escudos per kg. for the better class local fresh fish. It is yet too early to forecast what effect this will have on the local fishing industry.

Antibiotics for preserving meat

In the news item on this subject in our February issue (p. 87), the antibiotic "tetracycline" should read "oxytetracyline."

Sun dried candy

The feasibility of an experimental 1,000 sq. ft. solar air heater is being investigated by the Stanford Research Institute on behalf of the Commonwealth of Puerto Rico. If results are encouraging, S.R.I. will develop a design for an installation to heat air for drying candy. Other applications are under discussion.

Frozen food for air passengers

Qantas Empire Airways are preparing packaged frozen meals for air passengers on the international routes out of Australia from a plant which began full production last month. More than five tons of food are processed each week by the 40 employees. To keep the meals fresh, they are sealed in aluminium foil trays ready to go into aircraft. The plant is at Kingsford Smith Airport, Sydney, and is part of a three-storey passenger services building being erected for Qantas.

Processed potato

An Oslo firm is starting production of a new potato product. Known as "potarice," it is said that it has the same nutritive value as rice, can be kept stored for an unlimited period without deteriorating and is reasonable in price. It is also tasteless, and can therefore be used in many different dishes. It is thought that it will be especially suitable as military provisions, on board ship or for use in isolated places where potatoes cannot be obtained, and for making cheap but nourishing dishes out of "left-overs." Machines for making "potarice" are being made by a Norwegian firm. Several Norwegian firms are interested and a distillery in Romedal is already installing £1,500 worth of machinery to start production soon.

U.S. whisky imports

The effect upon U.S. whisky distillers of American imports of Scotch whisky—valued at over $60 million a year—is being studied by the U.S. Tariff Commission on the instructions of the Senate Finance Committee, who are not satisfied with the Commission's original report in January. This pointed out that the Board of Trade has relaxed its discrimination against imports of bourbon. The Tariff Commission is now to carry out a more thorough survey, clarifying the relative competitive position of foreign and domestically owned distilleries.

Packaging

Vacuum seals for marmalade

Frank Cooper, Ltd., have re-designed the export packs of their *Oxford* marmalade and fresh fruit preserves, using the two-piece R.O. vacuum seal recently developed by Metal Closures, Ltd. Their 1 lb. jar now accommodates a 70 mm. R.O. seal consisting of an inner panel of aluminium, suitably coated and carrying a P.V.C. compound gasket, assembled into an outer shell of aluminium, coated internally and decorated externally.

The combination closure is supplied in the usual unthreaded R.O. form, the thread being formed on the closure on application by the R.O. sealing machine, also supplied by Metal Closures, Ltd., the technique of application in this instance being as follows:

The product is filled into the jars at a temperature of say, 150°-200°F. according to the nature of the particular preserve being handled, and the jars fed automatically into the type A.C. sealing machine, running at 60 jars per min. The seals are fed automatically on to the jars, and immediately prior to the cap feed there is a steam injection unit, using super-heated dry steam, which completely sterilises the top of the jar and contents, as well as the inside of the seal, and which also serves to boost the resultant vacuum seal.

After the steam injection and feeding on of the unthreaded R.O. seal, the jar passes automatically under the sealing head of the machine, which applies a suitable head pressure to bed the P.V.C. compound gasket on to the sealing face of the jar and at the same time forms the thread on the closure, using the glass thread formation of the jar as a mould, thus providing a "tailor-made" thread fitment.

The jars are then fed automatically through a combined washing and cooling tunnel, with an ultimate internal vacuum of the order of 12-15 inches after final cooling off.

It is claimed that because of the two-piece feature of this seal, in spite of this relatively high internal vacuum and the large diameter of the seal, no difficulty is experienced in removal, neither is it necessary to pierce the seal to break the vacuum before removal. Upon unscrewing, the outer shell turns quite freely on the inner panel held on by vacuum and as the outer shell rises on the thread of the jar, it gently prises the inner panel off the jar and breaks the vacuum. The two components of the seal remain together and provide a good reclosure, offering a re-use feature for the ultimate empty jar.

A smaller size 48 R.O. one-piece seal is also used for 3 oz. jars. The general method of application is the same, but being of a relatively smaller diameter, these 48 R.O. one-piece seals can be removed quite easily without necessarily piercing to break the vacuum. The smaller 48 R.O. seals are decorated externally in a range of fully coloured old English country scenes.

These new export packs for Cooper's jams and marmalades incorporate the 2-piece R.O. vacuum seal.

Elasticised corrugated wrapping

An elasticised, crush-resistant, protective wrapping material, normally made from straw paper, has been introduced into this country from Italy, where it was invented, by Spicers, Ltd. It is called *Carbion*. Spicers are so confident of its success that they are equipping a 23,000 sq. ft. factory at Loughton, Essex, with Italian machinery for producing it. The factory should be fully working by the summer.

Although usually made from straw paper, *Carbion* can also be made from viscose film, cellular wadding, foil-laminated and coated papers for special purposes. The main features of all types is the double-way, undulated corrugations, which are simultaneously impressed into the flat paper during manufacture. One of the undulations develops in the vertical plane, perpendicular to the surface of the paper, and the other is horizontal and intersects the vertical, giving a zig-zag pattern. This process gives the paper a structural strength of its own, which makes it unnecessary to use the supporting flat sheets normally associated with corrugated paper.

In its elasticised, sleeved form, "Carbion," the new packaging material, clings neatly to the irregular outlines of bottles, glasses and tubes, affording considerable protection.

Tightly corrugated, it can be made up into seamless tubes which cling, like knitted sleeves round items such as bottles, delicate radio and radar tubes, fluorescent lights and fancy goods.

It is claimed that in either sheet or tubular form, this material recovers almost completely from sudden blows or sustained pressure and that its ability to resist impact is far greater than that of any other packaging material of its type in current use.

Two types of this material are available. The "rigid," or non-elasticised form, is useful as a lining for biscuit tins, chocolate boxes and similar items. In industry, its resilience makes it suitable for interleaving of highly glazed or polished sheets or fragile articles. In its flexible form, *Carbion* has many applications in industrial, commercial and domestic fields. The sleeved variety is particularly suited to the needs of wine and spirit shippers. These sleeves are usually made singly, but Spicers are considering making a continuous strip of pockets to reduce packing time and bulk handling problems.

New Companies

Howard Baker (Proteins), Ltd. (568500.) 16, Wood Grove, Liverpool, 13. Mnfrs. of or dlrs. in feeding stuffs, cattle foods, proteins, organic and inorganic fertilisers, etc. £10,000. Dirs.: B. Howard Baker, Junr., and P. Howard Baker.

John McKenna, Ltd. (568543.) 35, Cannon Street, Preston. Fruiterers, greengrocers, bacon factors and mchts., bakers, etc. £3,000. Dir.: J. C. McKenna.

Natty-Pac, Ltd. (568473.) Buyers, growers and sellers of vegetables, fruits, etc. £5,000. Subs.: J. H. Kembals, Wantisden Hall, Butley, Woodbridge, Suffolk, and D. H. Frodsham.

Northern Glucose Products, Ltd. (568992.) 33, West Sunniside, Sunderland. £5,000. Dirs.: G. H. Pickering, C. R. H. Comrie, H. Fine, A. Macbeth and W. Pickering.

F. Schofield and Son (Nantwich), Ltd. (568642.) 3, Mill Street, Nantwich, Ches. Retail butcher and provns. mcht. and mnfr. and distributor of cooked meats and table delicacies. £6,000. Dirs.: F. Schofield (ch. and permt.), Mrs. D. and J. A. Schofield.

P. Stratton, Ltd. (570568.) 19, King Street, King's Lynn. Corn and grain factors and brokers, etc. £100. Dirs.: C. T. Joice, H. J. T. Wilson, J. C. Burroughes and J. Stratton.

T. S. Ware (Wildhern), Ltd. (570434.) Littywood, Wildhern, Andover, Hants. Poultry farmers, etc. £5,000. Permt. dirs: T. S. and Mrs. E. A. E. Ware.

From Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

New Scottish Companies

Alliance Box Co. (Scotland), Ltd. (31954.) Mfrs. of boxes, cartons, cases, containers, etc. £200,000. Dirs.: not named. Subs.: G. M. Rhodes and J. S. MacLean, both of 172, St. Vincent Street, Glasgow.

The Atholl Brose Co., Ltd. (31959.) To acquire and take over the bus. of Moray Firth Foods, Ltd., Buchrew, Inverness-shire, and to carry on bus. of wine and spirit mchts., whisky blenders, etc. £100. Dirs.: not named. Subs.: A. E. H. Campbell, Ord House, Muir of Ord; and J. L. Haig, Kessock House, Kessock—both addresses in Ross-shire.

Samuel Hainey (Bankhead), Ltd. (31962.) Bankhead, Galston. Poultry farmers, etc. £3,000. Dirs.: S. Hainey, jun., and Mrs. F. E. Hainey.

Hillwood Construction and Produce Co., Ltd. (31952.) Fountainhall Works, Newbridge, Midlothian. Farmers, etc. £1,000. Dirs.: Peter Nimmo and A. N. Nimmo.

Lockhart Robertson (Merchants), Ltd. (31921.) Mfrs. of and dlrs. in bakery products and other food and drink. £100. First dir.: Elizabeth Lockhart, 85, Stamperland Drive, Clarkston, Glasgow.

McKinnon and McDonald (Scotland), Ltd. (31966.) To acquire goodwill of bus. of McKinnon and McDonald, Ltd., and to carry on bus. of millers, grain mchts., etc. £50,000. Dirs.: James G. Kynoch, Ravelston, Gullane, East Lothian; and John A. F. Lees, 21, Cargil Terrace, Edinburgh.

Technical Press Review

MARCH

Dairy Engineering.—Mechanical Handling Developments in the Dairy; Planning the Larger Dairy; History, Development and Prospects of Milk in Glass Bottles; A new Hard-Wearing Flooring for Dairies; Packaging Developments for the Dairy.

World Crops.—Ley Farming in the Australian Wheat Belt; Grassland Improvement; Herbage Legume Research at Aberystwyth; Rice Growing in Australia's Northern Territory; Behaviour of Radioactive Contamination in the Ground.

Chemical and Process Engineering.—Nickel Alloys in the Chemical Industry; The Interpretation of Engineering Drawings for Chemical Engineers; The Installation and Maintenance of Thermoplastic Pipes; Rayon Pulp from Wood; Transient Response of a Distillation Column; Sulphur from Sewage Sludge.

Corrosion Technology. — Corrosion-resistant Floors; The Use of Plastic Conduits in Electrical Installations; Strippable coatings; Corrosion; its Causes, Cost and Prevention; Basic Research into Linear Thermal Expansion of Teflon; Corrosion of Steel Piling in German Canals.

Automation Progress. — Work Handling between Machine Tools; Automatic Loading of Gear Hobber and Shaver; Trends in Automatic Milling and Baking; Background of Automation in the U.S.S.R.; Digital Computors in Oil Refining; Ultrasonic Machining, Part II; Continuous Weighing Problems; Hydraulic System for Tractor; Photoelectric Control of Colour Printing; Unit Head Production and Transfer Machines; Modern American Car Engine Plant; Packaging Highlights.

Petroleum.—Middle East Pipelines; A Pipeline Communication System; The Radio Systems used in the Trans-Iranian Pipeline; The Problems of Pipeline Laying; Tropical Pipelines; Manufacturing Detergents; Cutting Oil.

Manufacturing Chemist. — Fire Protection in Chemical Works; Chemical Fire Fighting; Fire Protection Equipment; Manufacture of Fire Extinguishing Chemicals; Fatty Acyl Alkylolamides I; Progress Reports: Fertilisers, Therapeutics, Antibiotics.

For specimen copies write to Stratford House, Eden St., London, N.W.1.

Trade Marks

NEW BERRY.—752,268. Chocolates and non-medicated confectionery, none containing fruits. **Meltis Ltd.**, 158, Drummond Road, London, S.E.16.

OOLY-POP.—756,384. Lollipops, being fruit flavoured iced confectionery. **John Hulley**, trading as **Hulley's Dairy and Ice Cream Factory**, 179, Cross Hill, Ecclesfield, near Sheffield, West Yorks.

PAN.—B751,372. Dried currants. **Panaigialios Enosis, Syneterismon,** Æghion, Greece, c/o Arnhold Trading Co., Ltd., Creechurch House, 37-45, Creechurch Lane, London, E.C.3.

RECO.—753,475. Tea. **Robert Eggleton and Co., Ltd.**, 14, Bittern Street, London, S.E.1.

SEA CADET.—748,948. Sweetmeats made of marzipan; chocolates, toffees, caramels, chewing gum, marshmallow, cachous (confectionery), liquorice confectionery; pralines, fondants, nougat and fudge; gums being non-medicated confectionery; and non-medicated sugar confectionery in the form of cigarettes or tablets. **Paramount (Laboratories), Ltd.**, 15, Irving Street, Leicester Square, London, W.C.2.

SENORITA.—752,124. Canned meats. **Sheed, Thomson and Co., Ltd.**, Hibernia Chambers, London Bridge, London, S.E.1., and F. Cook, Ltd., Alfred Road, Moorbank, New South Wales, Australia, and c/o Bromhead and Co., Manfield House, 376-379, Strand, London, W.C.2.

SCOTTISH PLAID.—752,479. Margarine. **George Mellis and Son, Ltd.**, 28, Guild Street, Aberdeen.

SINDULA.—753,757. Tea and coffee. **Whitehead Bros. (Manchester), Ltd.**, 18 and 20, Fennel Street, Manchester, 4.

SPRING MEADOW.—736,763. Butter for sale in the counties of Worcester, Warwick and Stafford. **Walter Cutler, Ltd.**, 61, Wrights Lane, Old Hill, Staffs.

STARBERRIES.—751,216. Non-medicated boiled sugar confectionery, chocolates and toffees. **Fryer and Co. (Nelson), Ltd.**, Victory Factories, Nelson, Lancs.

TAST-O-FREEZ.—745,958. Ice cream and iced confections, all made principally of milk products. **Pacific Factors Pty., Ltd.**, School of Arts Building, Great Western Highway, Springwood, State of New South Wales, Australia, and c/o Mewburn Ellis and Co., 70/72, Chancery Lane, London, W.C.2.

THUNDERBIRD.—754,650. Canned fish. **Napier Brown and Co., Ltd.**, 23 and 25, Eastcheap, London, E.C.3.

TICK TOCK.—751,710. Chocolate for covering foodstuffs. **The Farma Cream Product Co., Ltd.**, 23-25, Prince of Wales Crescent, London, N.W.1.

WHIRLIGIG.—B742,463. Non-medicated confectionery. **Chix Confectionery Co., Ltd.**, 15D, Argyll Avenue, Trading Estate, Slough, Bucks.

WOODPECKER.—753,189. Meat; fish, poultry and game (none being live); meat products, fish products, poultry products, game products and dairy products (all for food); fruits and vegetables, all being preserved, dried, cooked, bottled or canned; jam and marmalade; jellies (for food); and soups, edible oils and edible fats. **Overseas Commodities, Ltd.**, Finsbury Court, Finsbury Pavement, London, E.C.2.

ZOOM.—753,077. Biscuits for human consumption. **Meredith and Drew, Ltd.**, 339-377, The Highway, London, E.1.

Information and Advice

This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post. Enquiries cannot be answered by telephone.

Shredded coconut

B.8097. *I intend to start a coconut processing industry in the Bahamas. Can you tell me how to sweeten shredded coconut? I understand the shredded nut is exported, sweetened, then dry processed again.* (Montreal, Canada)

As you say, shredded coconut is usually sweetened after exporting, but there seems to be no reason why the process should not be undertaken beforehand.

The shredded nut is rotated with refined sugar and a small quantity of salt in copper drums for about 20 to 30 min. Glycerin is incorporated to render the shreds less brittle, and when the tumbling is completed the shredded coconut is transferred to driers. The nut is warmed and dried from a moisture content of about 45% to 5% moisture if packed in cartons and about 18% moisture if canned. Canned coconut is either vacuum sealed or the air in the can replaced with carbon dioxide. This is to retard rancidity, because the product contains about 40% fat. After drying, the product is screened and separated into grades differentiated by the length of the shreds. It is then piled in bins for blending and to equalise the moisture content.

Baby biscuit

B.8050. *Please send a recipe for making a baby biscuit with high tapioca content.* (Turkey)

No biscuit of this type seems to be known in this country, but here is a recipe for arrowroot biscuits, in which it may be possible with experimentation to replace the arrowroot by tapioca flour:

Soft flour	280 lb.
Arrowroot (tapioca)	14 lb.
Shortening	50 lb.
Glucose	10 lb.
Pulverised sugar	48 lb.
Salt	2 lb.
Ammonium bicarbonate	1½ lb.
Water or milk	5-6 gal.

On the whole a biscuit is not a satisfactory medium for incorporating vitamins, as they are largely destroyed in baking.

Coconut dainty

B.8054. *Please supply us with a recipe for making coconut dainty.* (Leicester)

We suggest the following recipe as a basis for experiment:

Granulated sugar	18 lb.
Corn syrup	9 lb.
Egg albumen	14 oz.
Dextrose hydrate	2 lb.
Water	8 pints
Vanillin	¼ oz.

Dissolve the albumen in 2 pints of water and beat to a froth. Place the sugar and corn syrup in a steam pan with the rest of the water, and cook at 236°F. Transfer it to a marshmallow beater, add the egg albumen and dextrose hydrate, beat to a light body, and add the vanillin. Cast the mixture in starch, allow it to dry overnight, and coat the mallows with chocolate. Decorate with coconut.

Pastry mix

B.8064. *Please advise us on a beef shortening for a pastry mix.* (Melbourne)

We understand from a company manufacturing animal fats that the most suitable deodorised beef product would be extruded beef suet, but they have no practical experience of its use in pastry mixes. Some big manufacturers use a good quality lard and pastry margarine in this type of product.

Information supplied

The Enquiry Service has dealt with requests for names of manufacturers and suppliers of plant, machinery and materials, and also general information as follows:

B.8005. *Information on freeing coffee from its caffeine.* (Auckland, New Zealand)

B.8006. *Suppliers of second-hand Autoclave for food processing.* (Worthing, Sussex)

B.8008. *Manufacturers of portable racks for moving and storing cooked hams.* (Coventry)

B.8009. *Formula for jellied dog meat.* (Farnworth, Lancs.)

B.8010. *Equipment and recipe for making ravioli.* (Finland)

B.8011. *Manufacturers of polythene bag automatic wrapping machine.* (Sydney, Australia)

B.8012. *Manufacturers of olive crushing and refining oil plant.* (Melbourne, Australia)

B.8013. *Information on bottling beetroot.* (Sheffield)

B.8014. *Suppliers of vegetables in brine.* (Grimsby)

B.8015. *Information on cheese processing for tube packing.* (South Africa)

B.8017. *Information on brominated vegetable oils for dispensing flavours for soft drinks.* (Manchester)

B.8018. *Manufacturers of preservatives for citrus fruits and fruit juices.* (London, E.C.1)

B.8019. *Manufacturers of meat rolling machine.* (New Zealand)

B.8020. *Manufacturers of oil extracting machines for making potato crisps.* (Glasgow)

B.8022. *Name of confectionery consultant.* (Belgium)

B.8023. *Information on nicotinic and ascorbic acids in preserving colour of beer.* (Dublin)

B.8025. *Suppliers of bakers' sundries.* (Winchester)

B.8026. *Formulæ for dried soup powders.* (London, E.C.3)

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

763,848. N.V. GOUDSCHE MACHINEFABRIEK: Process for the preparation of preserved fish or fish-meal, suitable for human and/or animal consumption.
763,879. J. MADER: Drying and cooling of grains and other flowable solid materials.
764,138. N. E. WERNBERG and C. J. KRAGH: Plant for narcotising bacon hogs.
764,223. WESTFALIA SEPARATOR A.G.: Process for obtaining sugar from sugar canes.
763,926. VEREINIGTE MAUTNER MARKOF'SCHE PRESSHEFE FABRIKEN: Process of producing yeast and similar vegetable cell material.
763,822. KRAFT FOODS CO.: Manufacture of cheese.
763,958. PNEUMATIC SCALE CORPORATION, LTD.: Vacuum filling machine.
766,822. A. K. OZAI-DURRANT: Quick-cooking rice.
766,456. J. HOLKER: Pie-making machines.
766,461 and 766,462. ROSE BROS. (GAINSBOROUGH), LTD.: Production of wrapped packages.
766,705. H. SIMON, LTD.: Purifiers for flour milling stocks.
766,376. KUSTNER FRERES ET CIE S.A.: Wrapping of portions of paste-like substance.
766,719. KORK-N-SEAL, LTD.: Apparatus for applying closures to bottles.
766,394. A. E. STALEY MANUFACTURING CO.: Refining vegetable oils.

ABSTRACTS OF BRITISH PATENTS

Food packaging material

Material which prevents undue evaporation without excluding air is made from a foil having a basis of a water-insoluble polymer of an a-b-olefinic monocarboxylic acid amide which contains (apart from the N and O of the amide group) only C and H. The polymer may be a co-polymer of the amide with 25 to 95% of acrylonitrile.—760,934. *Celanese Corporation of America.*

Production of infant foods

A specified quantity of a bifidus-active concentrate is added to a foodstuff to give a bifidus-active food preparation, preferably with a lactose-protein quotient $\geq 2{\cdot}6$. —761,866. *N.V. "Tervalon" Mij voor Voedingsmiddelen op Wetenschappelijke Basis (Scientific Food Co.).*

Cooking vat for potato crisps

The boiling fat, etc., is removed from one end of the vat and is fed in at the other, so as to carry uncooked potato slices supplied to the vat the latter end below a submerged run of a travelling endless wire mesh belt.—763,361. *J. E. Cruikshank.*

Smoking of bacon

A high degree of cleanliness with freedom from ash deposit is achieved by means of separate drying and smoking stages. A controlled air flow is circulated at a suitable temperature and humidity over the surface of the sides of bacon during the first stage. At a later stage ash-free smoke is added to the air stream at a controlled temperature from an isolated smoke producer.—760,592. *Danish Bacon Co., Ltd.*

Bread making

Bread bars of the "grissini" type are produced by extruding dough to form endless bars, moving these on a conveyor belt into a proving chamber, and subsequently drawing, cutting and baking the bars.—759,880. *F. G. Battagino.*

Dough preparation

A dough piece of predetermined length is cut from a mass, and is rolled, etc., transversely into a sheet while such length is kept constant. The sheet is then coiled, proved and baked.—763,263. *Baker Perkins, Ltd.*

Bakery equipment

The side and end walls of a baking tin, etc., are held in position by bell-crank levers which cause the tin to collapse outwardly when operated.—763,655. *O. Massey.*

Bottle labelling machine

Spaced belts which convey gummed labels are longitudinally ribbed on their inner faces to engage recessed pulleys, thereby eliminating belt slip.—759,741. *N.V. Maschinefabriek V/H. Jansen and Sutorious.*

Closure for jam jars

A resilient depending cylindrical flange of a jar lid is indented at diametrically opposite points to grip the jar. Such points can be moved outwardly by inwardly applied pressure along a diameter at 90° to that joining such points.—760,952. *Wallis Tin Stamping Co., Ltd.*

Box-wrapping machine

Open-topped boxes of biscuits, etc., are (partially) inverted by an oscillating gripper device by rotation about an axis parallel to the open top, and are transferred to a device which feeds them to a wrapping mechanism (*i.e.* so that the wrapper seam is above the open top).—760,947. *Schweizerische Industrie Ges.*

Wrapping machinery

Can-opener keys are fed from a supply device in orientated disposition into a magazine, and the keys are delivered individually to respective packages or their wrappers.—762,972. *Hesser Maschinenfabrik A.G.*

Foodstuff package

In *e.g.* a foil wrapper for cheese, the wrapper is initially applied to the cheese in two parts, one being stronger (mechanically) than the other, so that it can be progressively stripped without tearing (in jagged fashion).—763,137. *Kustner Freres et Cie., S.A.*

Chocolate enrobing machine

An archimedian screw, etc., elevator supplies chocolate from a main tank to a higher drip tank, and is mounted in a casing having a removable cover carrying a bearing for the screw, whereby the latter is removable for cleaning. — 763,480. *Oddys (Engineers), Ltd.*

Cocoa butter substitute

A fat of lower m.pt. than cocoa butter, *e.g.* coconut oil, is reacted with a $< C_{14}$ fatty acid, preferably C_{14-18} at 230-350°C. in the presence of an organic synthetic base-exchanger, and lower fatty acids formed are distilled off during the reaction. The product is used in the production of baked goods, chocolate products, and pharmaceutical or cosmetic ointments.—763,563. *Henkel and Cie G.m.b.H.*

Butter manufacture

A rotating unit (*e.g.* a gear-type pump) positively removes the butter through a discharge port in a churn, etc.—763,656. *Danske Mejeriers Maskinfabrik A/S.*

Lard shortening products

A blend of natural lard (5-95 wt.%) and lard modified by catalytic liquid phase treatment, *e.g.* with an alkali metal alcoholate, to cause molecular rearrangement.—763,299. *Armour and Co.*

Fat melting device

A heating device for use as (or as a component of) a fat melter includes a vessel containing material to be heated, a furnace box provided with an oil burner and disposed underneath the vessel, and flues for the combustion gases disposed on each side of the furnace box and adjacent the lower surface at the sides of the vessel and communicating with means for removing the combustion gases.—762,796. *City Welders, Ltd.*

Chicken feed

A feed-supplement composition comprising a culture of *Escherichia coli* and a non-nutrient growth promoting, non-bacterial substance, *e.g.* procaine penicillin.—760,691. *General Foods Corp.*

Animal feeds

An aqueous preparation of a viscous substance, produced by growth of vegetable organisms, *e.g.* gum-producing algæ, in mineral-containing water, and a suitable carbohydrate is fermented by means of a culture of a micro-organism to allow proliferation of the micro-organism and cause the product to dehydrate without killing the micro-organism. The product is used particularly in cattle feeds. — 763,232. *Applications Biologiques.*

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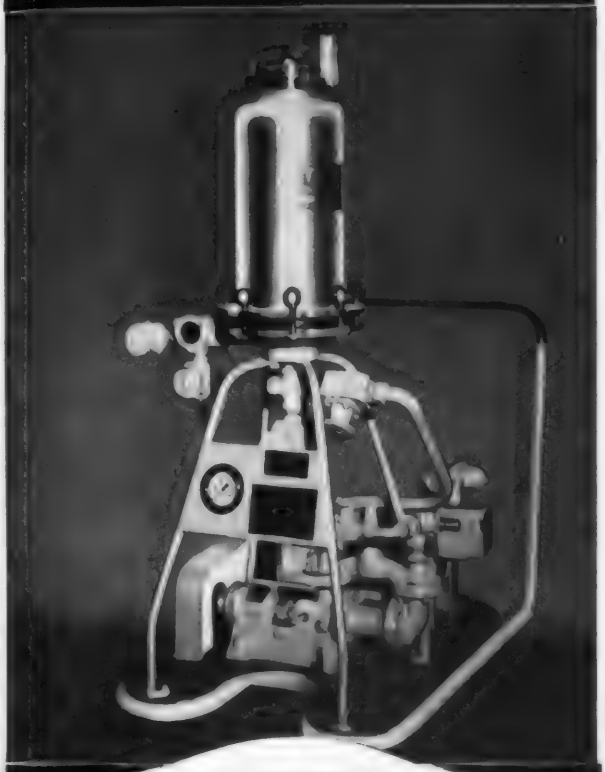

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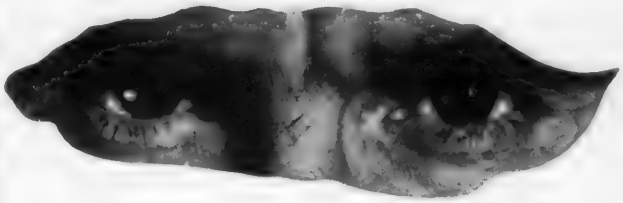

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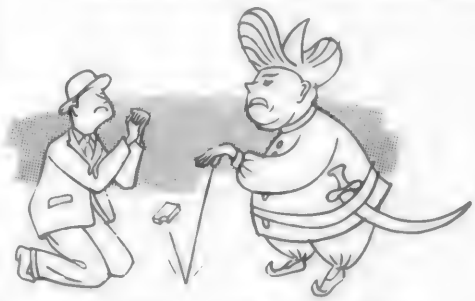
"It looks and feels like rubber, so
Have the agent imprisoned here
And send his company one ear".

The manager turned a delicate shade
Of green when one ear, post prepaid,
Arrived upon his desk one morn
Together with a note to warn
Of more to follow, perhaps feet,
Unless the goods improved "Toute suite"



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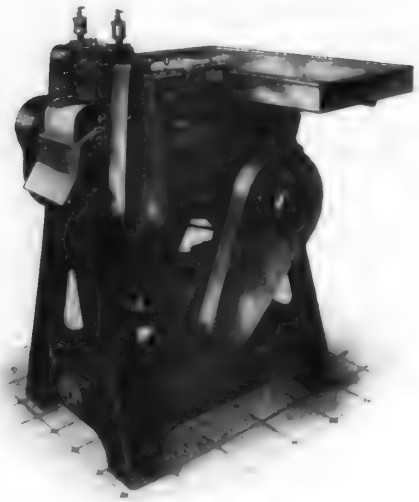

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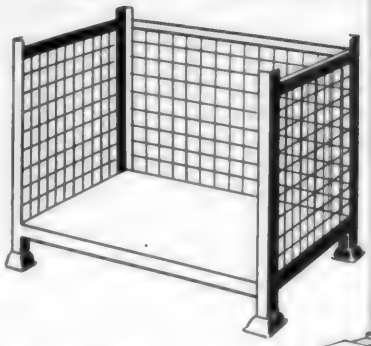
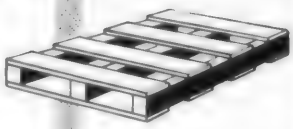
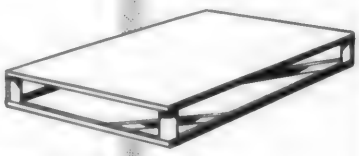


Cage type Stackable Pallets, suitable for cartoned foods, biscuits etc.



Flat Timber Pallets for handling and storing cartoned foodstuffs etc.



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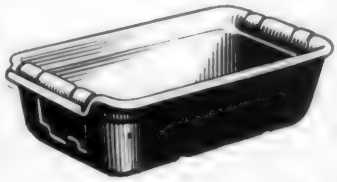

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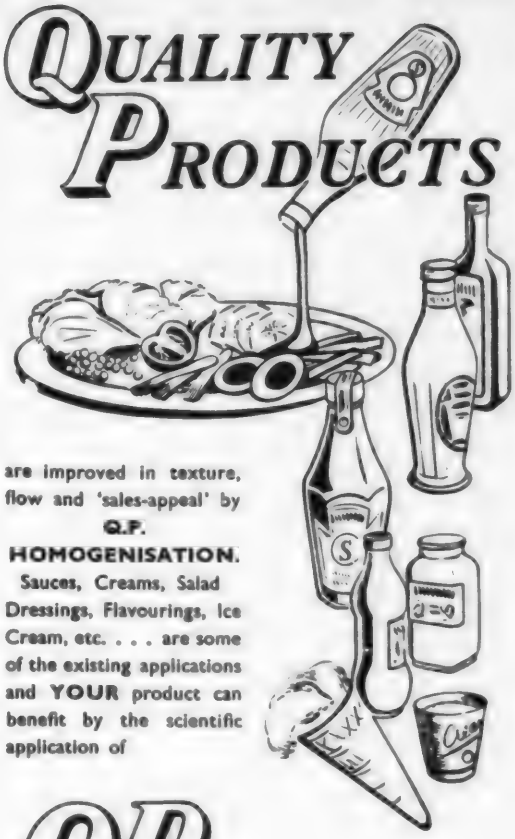

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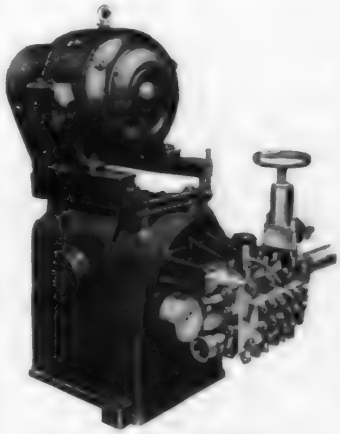

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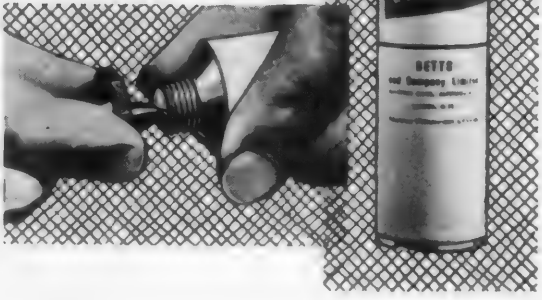

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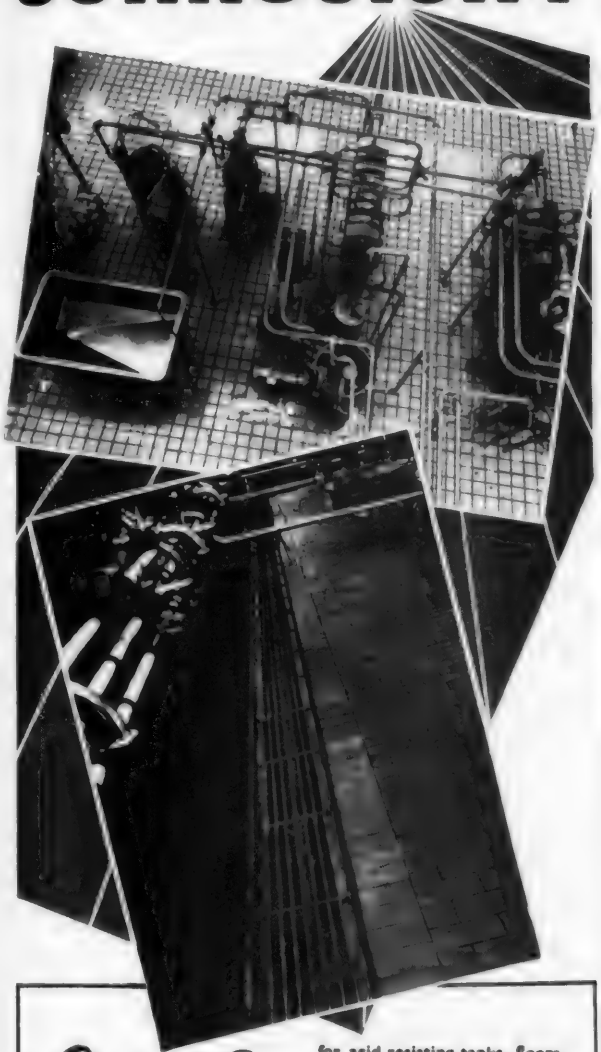

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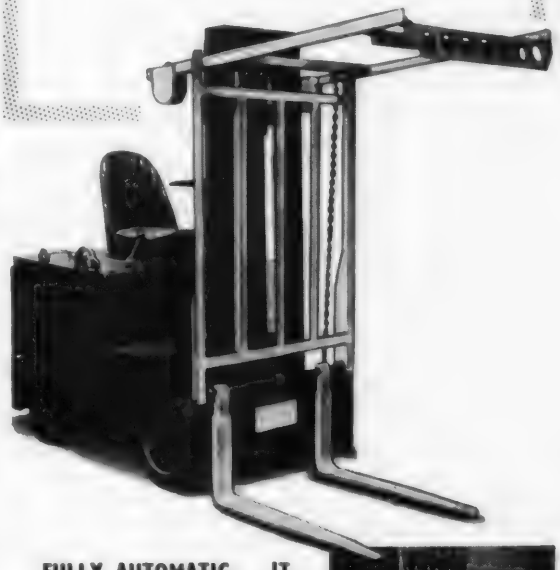

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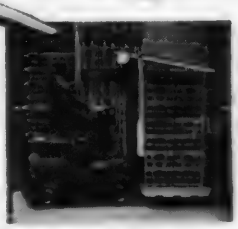

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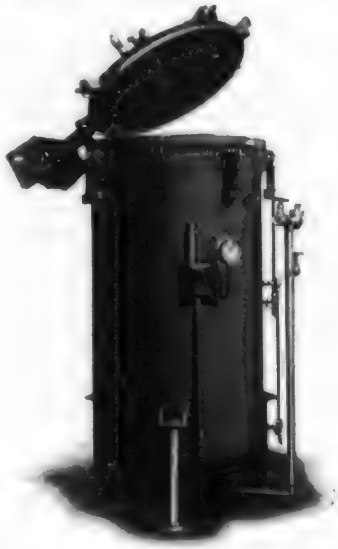

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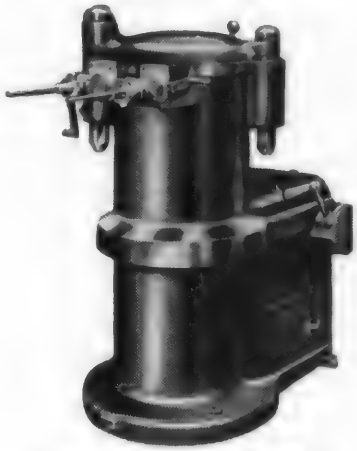

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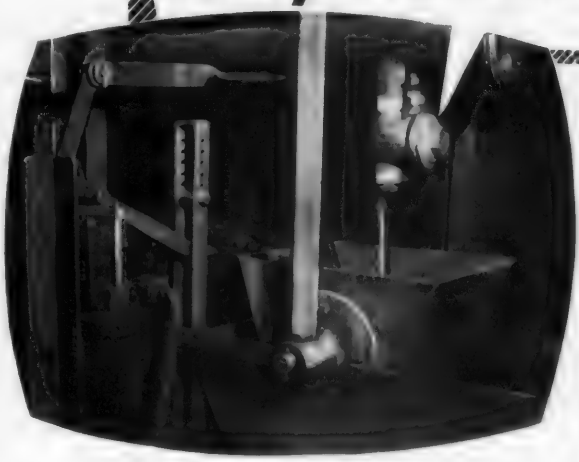

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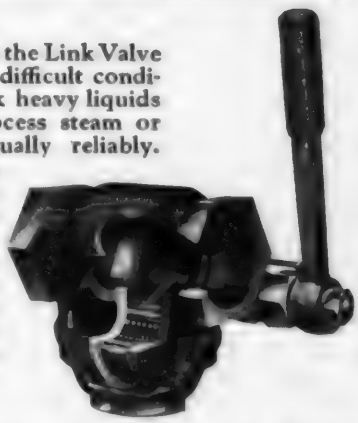

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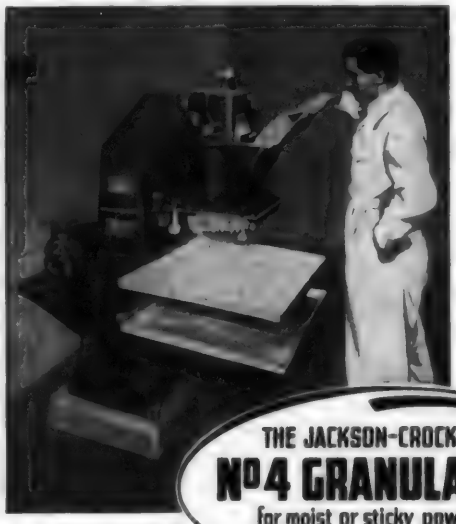

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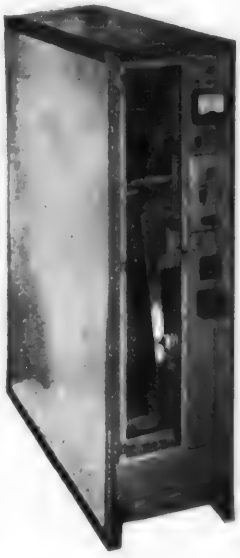

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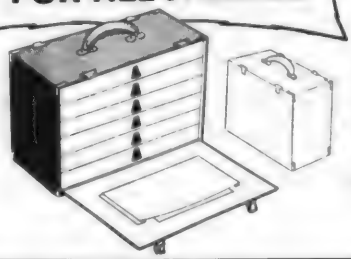

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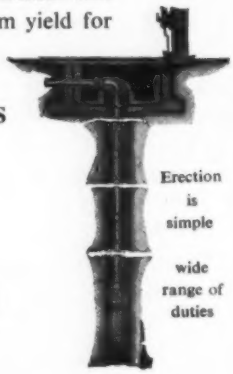

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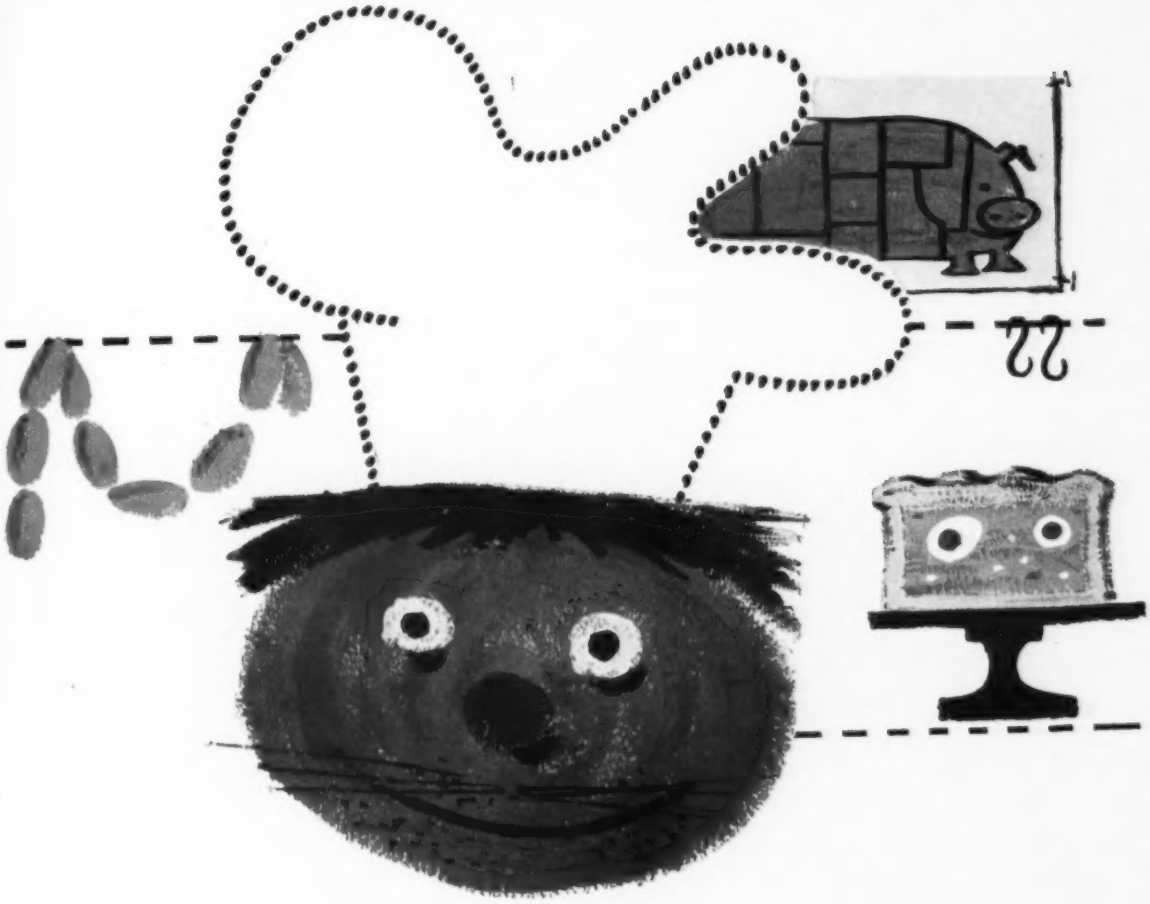

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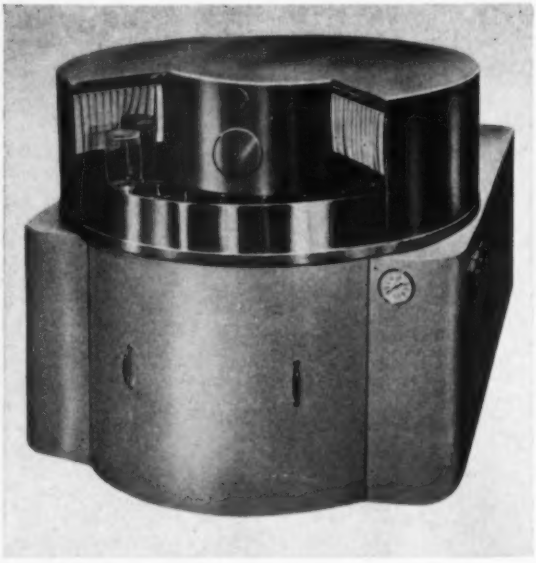

FIG. 452. A 60 Bottle size "Grangemouth" machine specially designed for more extended treatment, enlarged at the back to include two feed tank and pump units.

MADE IN THREE SIZES . . .

1. Output up to 1,500 bottles per hour
2. Output up to 3,000 bottles per hour
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FOR FOOD OR BEVERAGE CONTAINERS

The well-proved principle of the "Grangemouth" machine is common to all sizes and we have a model to suit all output requirements and washing sequences. Wherever a small simple machine is needed the "Grangemouth" Rinser is extremely popular.

The "Grangemouth" Power Rotary Rinsers are primarily intended for cleaning new bottles, vials and similar containers, and are made in 3 sizes—the 24-Bottle size; the 60-Bottle size and the Multi-jet size, with outputs of 1,500, 3,000 and 6,000 bottles, jars or vials per hour.

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Illustrated literature on "Grangemouth" machines will be gladly sent on request.

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